Adaption of Reduce, Reuse, Recycle (3RS) among market vendors in municipality of Santa Cruz, Davao del Sur

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***Abstract*— Waste generation in public markets have built up rapidly due to economic and population development which have resulted to harm the environment. This study was undertaken to determine the socio-demographic profile of market vendors specifically in terms of age, gender, civil status and ethnic origin, the adaption of reduce, reuse, and recycle of respondent's base on socio-demographic profile, the problems encountered in solid waste management and the significant relationship between demographic profiles of the respondents.**

The study was accomplished through the use of quantitative method in a correlational research design. A sample of 150 respondents in Santa Cruz Public Market, Davao del Sur were identified as the primary source of information through the use of total enumeration sampling technique. A self-administered structured questionnaire was used to collect the data which was developed by constructing a three part form, (1) demographic profile, (2) adaption of reduce, reuse, recycle (3R's), (3) problems encountered in solid waste management. Data gathered from the survey were analyzed by the use of the following statistical tools mainly; mean, relative frequency, standard deviation, and analysis of variance (ANOVA).

Result showed that most of the respondents were female, 38-47 years of age, single, Cebuano in nature and been actively engaged in business operation for 5-15 years. Most of the respondents prefer to adapt the reduce practice followed by recycle and least was reuse. Furthermore, data showed that adaption to 3R practice varies on the demographic profile of the respondents. Highest age group who often adapt the 3R practices were from 48-57 years old (4.23), least were from the ages 28-37 years old (3.37) who tend to adapt sometimes. Based on the data, highest gender who often adapt the 3R practices were male (4.17) over female (3.64). In terms of civil status, separated (4.50) respondents denotes the highest to adapt the 3R practices and least were widow (3.28). Results also revealed that in terms of ethnic origin highest to adapt the 3R practices were the Tagalog (4.55) and least were Chinese (1). Highest to adapt the 3R practice in terms of number of years in business operation were 1-4 years (4.15) and least were 16-25 years (3.40). Accordingly, most common problems encountered involved in the storage facility sanitation, improper segregation, storing and disposal and inadequacy of storage facility as well as segregation. Most common solid waste respondents chose to reduce, reuse, and recycle were plastics and least were metals.

Hence, the study revealed that there is no significant relationship between demographic profile and its solid waste management. On the basis of these findings, the researcher suggested that the Local Government of Santa Cruz must develop an effective and efficient policy that can aid local implementation of waste minimization and conforms to the national law. Utilization of funds for public market maintenance, trainings, seminars and sanitation projects must be prioritize.

***Index Terms* – Reduce, Reuse, Recycle, Market Vendor**

I. INTRODUCTION

The systematic administration of collecting, transporting, disposing, and separating waste materials and contaminants, which includes treatment, is a term that refers to the management of solid waste or better known as the Ecological Solid Waste Management in the Philippines. It pertains to human activities as a mitigating plan that has generally had a favorable influence on both environmental and health situations. It gives advice on how to prepare for any environmental problem, such approaches that could lessen any threat brought by human unfavorable actions towards its surroundings. It offers advice on how to effectively handle solid waste problems, as well as how to build and comprehend the integration of diverse solid waste management strategies, plans, measures, and practices. Solid garbage is waste that has been collected. Furthermore, it was identified as a worldwide challenge that brought impact to everyone, including individuals, families, communities, and governments, and hence requires long-term solutions. Waste that has been collected is referred to as solid rubbish. It has been identified as a global universal issue that impacts all individuals, families, communities, and governments, and hence requires long-term solutions as mentioned by Visvanathan and Trankler (2003).

According to Christensen (2011), accumulated solid waste can generate filth and environmental annoyances such as odors, flies, and blown trash, all of which are aesthetic issues. Solid waste disposal can damage the environment in the long run, transferring dangerous substances to the air, water, and soil, potentially destroying the environment and posing health and safety risks to humans. Morever, another factor that could at up to the building up of this solid wastes are the problems which significantly pertains to the sites of solid wastes where it is being disposed. Unattended and unsanitized area of disposal may accumulate the nesting of some pathogens that may threat the health of marketplace

vendors as well as consumers. The sites of solid waste are the places where insects and small rodents feed or nest and in this may cause infectious diseases in humans such as diarrhea, tetanus, eye infection and other illnesses. Hence, due to these effects, solid waste management has received much attention (Christensen et al., Shukor, Mohammed, Sani, 2011).

The Local Government of Santa Cruz, Davao del Sur is compose of 18 barangays. Barangay Zone III, has the second most number of population next to Barangay Astorga and it is where public market is situated. One of which who has generated solid waste the most is the public market. Yet, despite of the interventions taken by the Local Government of Santa Cruz, solid wastes remains increasing and mismanaged. Indiscriminate dumping of waste can be seen in any corners, this includes biodegradable and non-biodegradable materials. Insects and pests are rampant on this area which results to have an unpleasant and stinky odor. It is alarming knowing that it is a public place where people visit every day.

Reduce, reuse, and recycle (3rs) waste management will aid us to be more aware of our environment on how each of us be able to save it while also allowing us to gain the many benefits of becoming green. Doing so will promote the 3R concept's management, and is one of the paths to achieving long-term development. Furthermore to go beyond what is helpful for the preservation of the environment is one way of protecting ourselves from any untoward future problems. Hence, this paper target to study the practice of solid waste management emphasizing 3Rs of the market vendors in Santa Cruz Public Market, Davao del Sur.

Objective of the Study

The general objective of this study was to determine the solid waste management emphasizing 3Rs practiced by the market vendors in Santa Cruz Public Market of Davao del Sur, specifically it aimed to determine:

1. The socio - demographic profile of market vendors in terms of:

    1.1 Age;

    1.2 Sex;

    1.3 Civil Status; and

    1.4 Ethnic Origin

2. The adaption of Reduce, Reuse, Recycle of the respondent’s base on socio - demographic profile.

3. The problems encountered in solid waste management.

4. If there is a significant relationship between socio - demographic profile and the solid waste management of the respondents.

Significance of the Study

The result of this study would be of great help to the Local Government of Santa Cruz, Davao del Sur, public market, market vendors, market consumer, community, readers, and future researchers in the following ways:

Local Government of Santa Cruz, Davao del Sur. The findings of this study will redound to the benefit of the local government of Santa Cruz, Davao del Sur as this will able to know what effective components of 3R concept the market vendor adapt for further implementation and project supplementation especially for the problems of solid waste management that they encountered.

Findings of this study will also benefit the public market in waste minimization and in maintaining the sanitation of the areas. Moreso, with the economic activity and orderliness of the environment. Aside from that, this study would help the market vendors to save their business money as they could avoid from being charged of any penalties caused through their wrong actions. Furthermore, adapting 3R concept might as well be helpful to market vendors as this cold seemingly produce additional capital and minimized expenditure for this kind of concept me be of extra income for vendors if they only know and aware of the adaption of the reduce, reuse, and recyclr practices. Also, the result of this study would be of great help to all market consumers as this study would attempt to reveal what problems met by market vendors in solid waste management to intervene future environmental problems. Mitigating plan and action course on this problems would bring comfort to regular market consumers knowing that they are safer from adverse effects of waste materials that harms human health. They would also feel comfortable going to market for grocery.

On the other hand, this study would aldo develop community engagement and above all encourage community inclusion and economic advancement. This would also enlighten every members of the community to take actions in response to their obligations as member of the local community where they belong and promote awareness to each and everyone. Moreover, it will also develop a responsive community that is knowledgeable enough on resiliency and preparedness. Finally, this study will aid future researchers in doing their own research by serving as a foundation for their research and providing extra material for their future researches.

Scope and Limitation

The study was conducted in the entire second semester of school year 2020-2021 exclusively in the vicinity of Santa Cruz Public Market, Davao del Sur with the use of a prepared survey questionnaire.

The study was limited only to the following subjects: the demographic profile of market vendors, solid waste management practice emphasizing 3R concept that market vendors of Santa Cruz, Davao del Sur adapt, the problems they encountered in managing their solid wastes and the relationship of profile with regards to specific 3R practice

they adapt. The researcher only limited its data gathering on the registered market vendors.

II. REVIEW OF RELATED LITERATURE

The Republic Act 9003

The establishment of Republic Act 9003, beter yet known as the Ecological Solid Waste Management Act of 2000, was a watershed movement in Philippine solid waste management. This solid waste management policy focuses on source separation, recovery strategies, material recovery facilities, and strong stakeholder participation. Despite the fact that this national regulation was passed in the year 2000, which calls for ecological solid waste management to limit garbage generation and disposal, other LGU's do not adhere with local legislations, and inhabitants that continuously throwing their public wastes in an open spaces and waterways indiscriminately (Reyes and Furto, 2013). According to (Aquino, Derequito, &Festejo-Abeleda, 2013) that in the Philippines, Republic Act 9003 is a historic piece of environmental legislation. Republic Act 9003 renounces the state's mandates in complying and adhering to a systematic, well planned, comprehensive, and ecologically well-mannered adoption of managing the solid waste, this includes program that assures the right way of segregating, collecting, transportating, storing, treating, and disposing of garbages, as well as the protection of public health and the environment, by means of formulating and adopting best environmental activities. Furthermore, it exemplifies the approaches that is intended for the proper adoption of this 3r practices not just by means of putting action into it but also to improve the lives of many by gaining extra profit out of the wastes generated and consolidated.

Solid Waste

Solid waste refers to any non-free-flowing abandoned items resulting from human consumption and activities, such as empty bottles, discarded metals, and plastic fragments, rubbish, papers, glasses, food or animal products, disposable carrying bags, and woods that is being irresponsibly discarded anywhere (Abarca et al., 2013; Ravindra et al., 2014; Babyebonela, 2013). The presence of these materials can be seen primarily in most markets and is unfortunately an indication of inadequacy of setting this into action and regulation of stratefying the management of this garbages, which significantly includes market-based solid waste management planning and setting of gabage bins and waste trucks, and most importantly, on the process of storage and collection of this wastes in proper disposal areas and centers. (Davis M.W., 2014; Starr, 214 and Taiwo, 2011).

Municipal waste, building debris, and agricultural waste are all examples of solid waste. This garbage includes non-biodegradable and non-liquid items from universities and companies that accumulates from day to day activities and consumptions especially to those business sectors like public markets (R.A 9003). According to ISWA, (2015) that more or less around 50% of solid trash accumulated and produced by some of the urban areas in most developing nations went uncollected and left payed attention, with an estimated 2 billion people across the globe having no assistance when it comes to solid waste collection, and about more or less 3 billion of people having no proper and effective garbage disposal strategies and approaches. As a result, this discarded wastes unfortunately pollutes the ground and surface water of any countries which irresponsibly so not think of the consequences brought by negative actions (Oyoo et al., 2014). As stated by (Guerrero et al., 2013) majority of developing countries' towns are susceptible to depositing discarded wastes are left in drainage systems, vacant spaces , roadside or streets, rivers, and, worst of all, the ocean. Solid waste management is a very important tool and utility that derve as a key service to the community, but it is das to say sometimes overlooked, undervalued, and given low priority by most of the people, especially those under authority (ISWA, 2015).

As stated by World Bank (2021), yearly, the globe could actually produce around 2.01 billion tons of municipal solid wastes, with 35 percent of that being irresponsibly treated and handled in accordance with an environmentally friendly manner. The average quantity of rubbish produced by single person each day in the globe is 0.74 kg, however it is estimated from 0.11 kg to 4.54 kg. According to a report released by the Philippine Senate Economic Planning Office, the country's garbage accumulation has gone increasing from 37,427.46 tons each day in 2012 to 40,087.45 tons in 2016. Apparently, by 2025, the total amount of solid trash that can be generated by cities of the Philippine region is unfortunately looking forward to rise up by 165 percent, to 77,776 tons (Mawis, S.M.D., 2019). Meanwhile, about one-third to two-thirds of solid waste produced in cities is not collected in an orderly and environmentally manner, so as a result it is frequently dumped irresponsibly most commonly on streets and automatically obstruct sewers and contributes to flooding as well as pest infestations. As a consequence of difficult living conditions, people residing in urban poor districts, slums, and low-income or average settlements are more likely to face and experienced life-threatening diseases that could add up to their burdens as this could be of more expenses in terms of medication and so ever. Accordingly when waste is not properly handle, one of the solutions taken by people living in a slum areas or nearby seas prefer to dump it indiscriminately nearby. (Philippines Canada Local Government Support Programme, 2003; UNEP/IETC, 2009; Premakumara et al, 2011).

Solid Waste Generation

The Philippines is no exception to the rapid urbanization that most countries are experiencing. Due to changes in lifestyle, consumption patterns, and economic growth and development, trash volume and diversity have increased dramatically in recent years (Oliveira et al, 2013; Premakumara et al, 2014). On the other side, according to

(EMB, 2015), there are an estimated 39,422 tonnes of municipal solid wastes produced by some municipalities in the Philippines. Domestic solid wastes, tosh, and solid waste coming from different public spaces such as public markets and hospitals are among the elements that have been overlooked to have the most produced solid wastes (Dangulla M. and Kasimu M.Y., 2016). Report have said that the Philippines' population has significantly grew, from 27 million in the 1960s to 88.57 million in 2007. For the years 2000-2007, the population jumped off at a pace of roughly 2.04 percent per year (NSO, 2011). Therefore, with the fast growing population and urbanization of the country it affects significantly the waste management and waste generation automatically. As the world's population grows, so does the amount of waste produced each day.

South Africa is the country that generates the most solid trash in the entire globe (Greencape, 2017; ISWA, 2015; RDI Roadmap, 2015). According to estimates, South Africa produced 108 million tons of solid wastes by 2012, with 59 million tons of that being categorized as general waste (DEA, 2012). As a result, it appears that solid waste is a problem in South Africa, particularly in impoverished areas (Godfrey, 2016; Samson, 2004). According to (Statistics South Africa, 2016), South Africa suffers from a shortage of solid waste management, with only 66 percent of the population receiving rubbish collection services from municipalities or private companies.

Solid Waste Storage and Collection

The majority of the costs of local management of solid waste systems are now borne by collections, and their performance has resulted in significant reductions in marginal cost, financial and environmental management, and urban planning (Nafiz et al., 2017). However, trash storage is vital portion of the local solid waste management system. It is critical for efficiency, data collection, and citizen involvement. Because people play such a challenging role in accomplishing effective reducing of garbages, their engagement is challenging (Anderson and Stage, 2018; Ibaez-Fores et al., 2018). Increased understanding of environmental challenges is one of the world’s priorities. Under a decentralized structure of governance, MSWM stakeholders are mandated to strictly comply and follow as well as take measures to take collective involvement. This system is a crucial instrument for maintaining solid waste service, particularly in public markets. On the other hand, local governments holds a critical respnsibility in the effective and efficient collection of garbages, as well as its storage, transportation, and disposal. As a result, they must establish a solid waste storage and collecting area, as well as a schedule for transporting solid waste from their separate areas to treatment and dumping facilities (Davis, 2014; Starr, 2014; and Taiwo, 2011). One reason that solid trash is left uncollected is due to a lack of adequate solid waste collection vehicles. Both public and private organizations have stated that the current system is insufficient (ISWA, 2015)

Solid Waste Segregation and Processing

The method of separating garbage into distinct elements is known as waste segregation (Shanghai Daily, 2014). Hand sorting was the first method utilized in the history of waste segregation, according to Schlesinger (2013). Separating of garbages mainly coming from the point of origin of this garbages is a technique that involves classifying various types of solid materials from where it came from first in order to promote resource recycling and reuse (Article 2, Section 3, R.A 9003). WACS was done by the NSWMC in order to update its baseline assessments and gain a proper comprehension with national solid waste landscape. Residential regions produced 57 percent of the country's garbage, followed by commercial sources with 27 percent, institutional offices with 12 percent, and the industrial and/or manufacturing sector with four percent (NSWMC, 2015).

Meanwhile, processng of this garbages is the process of changing the physical characteristics of solid wastes to make them more suitable for the technology used to treat them. The processing of solid wastes aids in getting the most out of each component of the SWM system. To get the best economic value, it requires a careful selection of processes and efficient equipment. Baling, shredding, compression, drying, metal segregation, and other processes are commonly employed in solid waste processing. The basic goals of solid waste processing are to illevate the effectiveness of delivering proper waste management system, recover resources, and recover conversion products and energy (Pandey Asha, 2013).

Waste Characterization and Segregation

As stated by Aquino, et al., (2013), the production of this garbages throughout the jurisdictional area must be described for the local waste management plan's first move on reducing wastes ang applying the best concept of recycling. For on-site collection, each sort of solid wastes must be placed in its designated container, properly labeled as "biodegradable," and "non-biodegradable,". Priority should be given to waste separation. Source reduction is a strategy by which local governments can minimize the quantity of solid trash they dispose of in five (5) years. Local government units are required to convert more or less 25% of total garbages from waste disposal facilities through re-use, recycling, and composting efforts. Every three (3) years, the rate of waste diversion will grow.

The 3R Concept

To increase the durability of items being reuse, especially compostable organics, waste management begins with reducing trash creation and separating possible recyclables at the source. If at all feasible, those impossible to decreased are adviced to use again. For those items that is impossible to recover by using again or by limiting its

generation areadvice to be recycled. For those wastes that is as well impossible to recycle are adviced to go through bacteriological breakdown, burned, or landfilled (World Bank, 2005). Reduced reuse and, especially, recycling have become the only techniques of rubbish disposal that are acceptable (Daniel, 2003). Zero waste is a program that encompasses trash to be decreased, use again, recycling, and composting, resulting in zero waste disposals and zero waste-related warming. Indeed, achieving "zero waste" appears to be hard however a possible goal. If numerous waste management choice and apps be able to combined (Adedipe et al., 2005).

Reduce

The term "decrease" refers to the lowering in the quantity and/or toxicity of waste entering the waste stream is commonly known as reducing. Green raw materials, the longevity and durability of products usage, better designing of its process, reduced energy and somehow eliminate its heat, and the substitution of raw materials with lighter materials can all help to reduce garbage production. 'Reduce' is the first element of solid waste management when talking about the level of effectiveness among practices since it is known to be the best way of lowering the economic costs and adverse effect to the nature as well as to mankind. For effective waste reduction at the source, a life cycle evaluation is critical. (Ela and Masters, 2013).

Reuse

The word 'Reuse' usually talks about the reusing (or re - utilizing) of a certain item with like purpose from where it basically originated when it comes to usage. Just for instance, a plastic bag basically can accommodate items or products home from the merchandisers, supermarkets or shopping malls whenever it is needed. An item may as well repurposed for a different function, as when container glasses are repurposed in a store to house small things like screws and nails. The term "re-manufacturing" is frequently used in this context, and it refers to the action of bringing back an item to where it is originally being first used. It entails involves an items're – cleaning and repairing the most commonly used pieces, and then storing them in inventory. (Masters and Ela, 2013). Meanwhile, pieces that have failed are replaced, whereas repair entails replacing only the ones that have failed.

Recycle

After source reduction, bringing back of the products purpose by means of recycling is accorded to be in the middle of leveling among the three practices of solid waste management when it comes to its effectivity. The term "recycling" simply refers to the utilization of garbage as a source of raw materials for other goods. It include collecting and sorting recyclables, as well as converting them into raw materials for other products. There are two types of products that can be recycle: first consumer and end consumer. Pre-consumer materials are scrap that is recycled back into the manufacturing process without being turned into a valuable product. Items which people most commonly used, like used old papers or plastic containers, are classified as post-consumer recyclables. Anode materials include glass, aluminum, heavy metals, and building and demolition detritus (Masters and Ela, 2013).

Importance of the 3R Concept

According to Beaty (2013), reducing, reusing, and recycling are the "3rs" of sustaining the proper management of this solid wastes that all of us all knew about at some point. The "3rs" are meant to cut down on waste and save natural resources. When it comes to benefitting from corporate responsibility, implementing "green" practices such as the "3rs" at a business level is a good way to engage with. In addition, Clements (2018) have stated that the 3r's of waste management is one of the best ideas to mitigate certain environmental challenges and solution to the ever growing environmental, health and economic issues caused by accumulation of this mismanaged solid wastes.

The 3R principle assists us in living a more sustainable lifestyle. By letting and helping citizen understand the future challenges of their ways and means of improper consuming and producing of wastes may somehow eradicate the problem and by encouraging them to change their way of living may reduce the harmful effects to environment brought by this irresponsiveness people have. Reducing, reusing, and recycling all contribute to the preservation of the environment in the next generation (Syed, 2006, Mohan et al, 2011, Lino and Ismail, 2012). Furthermore, when lots of goods are adheres on reducing, reusing, and recycling, the quantity of garbage that is intended to dump in a dumpsites is being lessen, which resulted to keep expenses for this activities be lessen otherwise and somehow save landspace to be used (UNEP, 2003, Lino and Ismail, 2012). Furthermore, as the demand for recyclables grows, lots of people will be needed to consolidate, separate, and process them, creating more jobs. Job possibilities can also be created through reuse centers (Ankit, et al., 2005, Kun Yue, 2012).

The 3R technique reduces problems on damaging the quality of air that we breathe while simultaneously cutting CO2 and greenhouse gas building up (UNEP, 2003, Conrad and Jan, 2010, Mohan et al, 2011, Lino and Ismail, 2012). To recycle also minimize the consumption of energy (Conrad and Jan, 2010, Kun Yue, 2012, Sifang et al, 2012) and lessens water contamination (Conrad and Jan, 2010, Kun Yue, 2012, Sifang et al, 2012). (Conrad and Jan, 2010). (Ismail and Lino, 2012). Other parts of the world lack natural resources, but has the capability to produce waste materials such as paper as raw materials for their corporate operations.

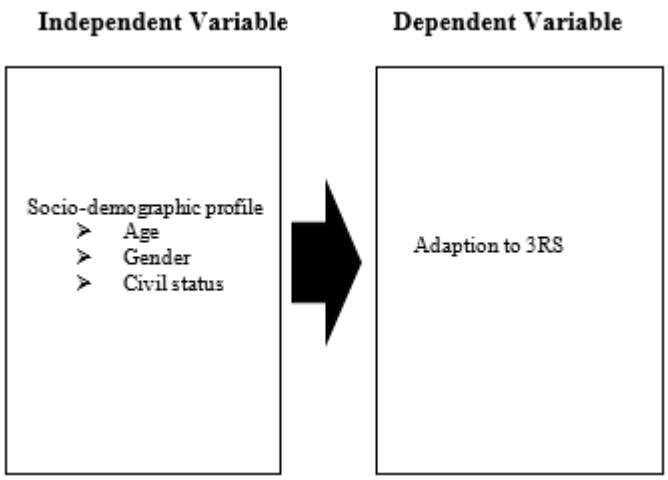

Figure 1. Research Paradigm

Figure 1 shows the relationship of the socio - demographic profile consisting of the following items, age, gender, civil status, and ethnic origin of the market vendors (independent variables) to the adaption to 3Rs (dependent variable). The researcher would like to examine the relationship of the variables in the study.

Hypothesis

There is no significant relationship between the socio - demographic profile of the respondents and their adaption to the 3Rs in Santa Cruz Public Market, Davao del Sur. The level of significance or the probability of accepting the null hypothesis of this study is when the P – Value is higher than the Alpha which is 0.05.

III. METHODOLOGY

Research Locale

This study was conducted in Barangay Zone III, Santa Cruz Public Market which is located at the Province of Davao del Sur. It is only about a 3 minute walking to reach from Barangay Hall Zone III. The public market comprise of the following sections: Fish Section; Meat Section; Dried Fish Section; Grocery Section; Houseware Section including RTW's; Rice Grain Section; Fruits and Vegetable Section; Eatery and Bakery Section; Agri-Vet Section; and Miscellaneous Section.

Research Design

This study employed the used of Quantitative Method in a correlational research design in determining what particular 3R practice market vendors adapt and its relationship to its socio - demographic profile. Using statistical data, correlational research aims to identify the the degree to which two or more variables are related. This design approach looks for and understands connections between and among a variety of information. This type of research looked for trends and patterns in data, but it didn't go so far as to prove causation for the patterns it found. Cause and effect aren't used in this type of observational research. Only the data, relationships, and distributions of the variables are analyzed. Groups are not altered; rather, they are recognized and studied in their original environment (Creswell, 2008).

Respondents of the Study

The registered market vendors in Santa Cruz Public Market, Davao del Sur were the primary respondents of the study, since they are considered as the primary source of information. The researcher used total enumeration sampling technique in determining the number of samples. However, as the COVID-19 pandemic progresses, stringent adherence to ongoing and necessary public health measures will be required. As a result, some market sellers declined to participate in the poll. Furthermore, due to COVID-19 outbreak, business conditions are fast deteriorating, many shopkeepers and market stall owners are retreating to their corners, unable to pay their bills. Local Government of Santa Cruz, Davao del Sur have ordered this stall owners to be closed after giving a months of grace period and after a resolution was approved. Therefore, sample size of the respondents were down to 150 from 217.

Determination of Sample Size

Sample size of the respondents was determined by getting the total number of all the registered market vendors from the Market Supervisors Office/Local Economic Enterprise Management Office and contacted all market vendors on the list.

Research Instrument

A self - made survey questionnaire on demographic profile, and determination of 3R adaption about solid waste was used to gather responses and data. Part one talks about the socio - demographic profile of the study respondents with the following items, address, age, sex, civil status, designated market section and years of doing the selling activity at the market. The second part composed of seven columned table. First column indicated the 3R practices they adapt and the solid wastes they Reduce, Reuse and Recycle. The next 5 columns was labeled 1-5 to tell as to what extent market vendors adapt the 3R practices, 5 – Always or all the time, 4 – Often or frequently, 3 – Sometimes or occasionally, 2 – Seldom or rarely and 1 – Never or not ever. The seventh column reveal the estimated volume of solid wastes market vendors generated. Unstructured questionnaire for Part III, gave an opportunity for the respondents to imply their responses in accordance to their point of view. Self – made questionnaire was checked and validated by the advisory committee.

The respondents rated the variable using likert scale in order to interpret the response of the respondents. It is used in determining the Adaption of Reduce, Reuse, Recycle (3Rs) Among Market Vendors in Santa Cruz Public Market, Davao del Sur.

Sampling Technique

The researcher used total enumeration sampling technique in determining the number of samples. Total enumeration technique is a sort of purposive sampling wherein the entire respondents of interest is sampled, with all members sharing common features (Lavrakas, 2008).

Table 1. Distribution of the Respondents

Market Section	No. of Samples
Dry Market	127
Wet Market	23
TOTAL	150

Data Gathered

The data gathered in the study includes the socio - demographic profile which contains age, gender, civil status, ethnic origin and business profile of the registered market vendors the 3R practices they adapt, as well as the problems that they encountered in Santa Cruz Public Market.

Data Gathering Procedure

Gathering all the necessary data were done through the following steps:

Before the conduct. Prepared and secured a municipal request letter in relation to the list of registered market vendors and an informants consent as well as barangay consent personally accomplished by the researcher intended for the actual conduct of the study signed by the thesis adviser and the program head. Submitted the prepared letter of request to the Local Economic Enterprise Manager's Office for the official listings of registered market vendors. All questionnaires were as well validated by all members of the advisory committe ensuring the validity and accuracy of the data gathered.

During the conduct. Upon the conduct of the study and distribution of survey questionnaires the researcher observed the minimum health standards as mandated by the inter-agency task force in preventing the transmission of COVID-19. The researcher presented the informants consent to the registered market vendors formally asking permission for their participation. The data gathered was be sealed with confidentiality.

After the conduct. Data were tabulated and interpreted by the researcher with the assistance of the researcher's statistician..

IV. RESULTS AND DISCUSSION

Demographic Profile of Market Vendors

In this chapter, the results of the study are presented and discussed with referrence to the aim of the study, which were to determine the following : demographic profile of the market vendors in terms of the following variables; age, gender, civil status, and ethnic origin; the adaption of reduce, reuse, recycle of the respondents base on the demographic profile, the problems encountered by the respondents in solid waste management and if there is a significant relationship among demographic profile andhow solid waste were being managed.

Table 2 showcases, the demographic profile of the market vendors in Santa Cruz Public Market, Davao del Sur. Majority of the respondents were from the ages 38 – 47 years old, since this ages were most commonly active in selling activities, while the least age bracket were from the ages of 18 – 27 years old, since this were those individuals who still study. Most of the respondents were female, since this group of respondents are more capable of engaging in selling activities, while least were male respondents, since this were those individuals earning for other means of living to support family needs.

On the other hand, majority of the respondents were single, since most of the market vendors interviewed during the conduct of the study were primarily composed of daily compensated young market vendors. Least were those separated individuals.

In terms of their ethnic origin, majority of the percentage were mostly covered by Cebuanos, since Mindanao is dominated by Cebuanos and least were those Chinese individuals, since this group of people commonly resides in Davao City part of Region XI.

When it comes to the number of years inoperation, majority were those belong to 5 – 15 years in selling operation, since public market of Santa Cruz is a newly constructed building, wherein new market vendors applied for stall registration. Least were those operated for 36 – 45 years in business.

Finally, in terms of its designated market section, all respondents differ in adapting the 3R practices base on the the respondents area or field of marketplace. However, respondents have shared common problems with regards to problems encountered in solid waste management.

Table 2. The Socio-demographic profile of the respondents

Profile	**F**	**RF (%)**
Age		
18 – 27	14	9.33
28 – 37	24	16
38 – 47	43	28.67
48 – 57	39	26
and above	30	20
Gender		
Male	45	30
Female	105	70
Civil Status		
Married	27	18
Single	103	68.67
Separated	6	4
Widow	14	9.33

Ethnic Origin		
Cebuano	93	62
Ilocano	26	17.33
Tagalog	9	6
Bisaya	19	12.67
Boholano	2	1.33
Chinese	1	0.67
Numbers of Years in Business		
1– 4	19	12.67
5 – 15	80	53.33
16 – 25	37	24.67
26 – 35	11	7.33
36 – 45 46 and above	3 0	2 0
Designated section Dry Wet **TOTAL**	 127 23 **150**	 84.67 15.33 **100**

Adaption of 3R Practices

Table 3, shows the adaption of 3R practices in terms of the socio - demographic profile of the respondents, composed of age, gender, civil status, ethnic origin and their number of years in business operation.

When it comes to respondent's age, mostly the respondents prefer reducing over reusing and recycling practices, wherein according to the data, reuse got the lowest mean. The age bracket of 18 – 27 has the highest mean of 4.18 or Often, which means, that this age group frequently practiced the 3r schemes of solid waste management, while the age bracket of 28 – 37 has the lowest average weighted mean of 3.4 or Sometimes (see Appendix 7, Part 2.A). Younger individuals tend to follow strict implementations imposed by the government since this group of people were afraid of committing violations reasons why this group of individual were more compliant with following proper waste handling. Even though individuals in Gaborone, Botswana, have the knowledge of recycling and other ways of managing waste strategies, still it is not always converted into engagement in pro-environmental activities such as recycling efforts, according to one study. Despite their little awareness of waste management improvements, they do not appear to have embraced it. (Bolaane, 2006). Having no interest in the preservation and protection of the environment is one major concern that affects the decision making of an individual citizen. This attitude contributes to a lack of accountability for pollution and waste issues. In the end, this results in communities that are unaware of or unconcerned about their environmental impact (Poswa, 2001).

In terms of the respondent's gender, respondents prefer reducing practice over reusing and recycling practices, wherein based on the table, recycling got the lowest mean of 3.72 or Often. Male got the highest average weighted mean of 4.01 or Often, which means that, this group of respondents frequently practiced the 3r schemes of solid waste management, while female only have an average weighted mean of 3.58 or Often (see Appendix 7, Part 2.A). One male respondent have reiterated that their contribution to market activities seems to goes more on physical activities. Factors affecting this result, is that men are highly more involve in physical activities in public market, like arranging store displays, as well as closing and opening stores. One of which is keeping the store surroundings tidy, especially during opening and closing period. Usually, men are task to carry the obligations of throwing rubbish and other unnecessary things in the store area. However, the lack of cooperation of the market vendors in managing solid waste properly is one factor that contribute to poor management of market sanitation.

Meanwhile, on the respondents civil status, most of the respondents prefer reusing over reducing and recycling practices, lowest data on the table was reducing practice with a mean of 3.83 or Often. Separated individuals have the highest average weighted mean of 4.38 or Often, which simply implies that, this group of respondents frequently adapt 3r practices of solid waste management in the market, and lowest was single respondents with an average weighted mean of 3.51 or Often (see Appendix 7, Part 2.A). Separated respondents were mostly those older individuals. Older person tend to reuse materials once being used, rather than setting it aside or just simply throwing it away. One of the respondent have stated that practicing solid waste management takes a lot of effort and may sometimes consumed a lot of time and money maintaining this kind of practice, the lack of market utility that could somehow take the responsibility of maintaining market sanitation is another problem that most of the respondents cited.

Finally, in terms of no. of years in business operation, most of the respondents prefer reusing over the other two practices. Tagalog respondents have the highest average weighted mean of 4.40 or Often, thus this respondents frequently adapt the 3r practices of solid waste management while lowest was Chinese, with an average weighted mean of 2 or Seldom (see Appendix 7, Part 2.A). The diverse behavior of the respondents is one factor that contributes to the manner of managing solid waste properly. Some respondents were used of doing the practice regularly. One of the Tagalog respondent stated, that it has been a practice adapting the reduce, reuse, and recycling scheme from where this individual came from. This is due to the strict implementation of solid waste management that is being acquired from the local government.

Overall, with an average weighted mean of 3.63, reduce practice of solid waste management occurs to be the most frequently adapted practice among the 3r practices utilized by the overall respondents, followed by reuse with an average weighted mean of 3.57 and lowest was recycle with an average weighted mean of 3.52, regardless of the

respondents socio- demographic profile. According to Tinio (2021), just 5% of total Philippine waste is recycled as of 2016. As a result, it's crucial to remember that lowering the amount of solid waste generated reduces the amount of money needed for collection and disposal. This would also help to solve the problem of insufficient storage and other measures of material recovery. Waste reduction is at the top of the hierarchy. This is the best solution because the most effective approach to limit waste's health and environmental repercussions is to avoid creating garbage in the first place. Reuse is described as the process of repurposing a waste product without further processing or altering its shape or original nature. The second option in the waste hierarchy is reuse, followed by recycling. The results demonstrated that the respondents learned to reduce, reuse, and recycle in opposition to the system's heirarchal sequence.

TABLE 3. Adaption of 3R Practices of Market Vendors

Topic	Age	Gender	Civil status	Ethnic origin	No. of years	AWM	Description
Reduce	3.81	3.90	3.83	3.48	3.15	3.63	Often
Reuse	3.65	3.77	3.97	3.38	3.10	3.57	Often
Recycle	3.8	3.72	3.85	3.20	3.07	3.52	Often

Problems Encountered in Solid Waste Management

Table 4, shows the problems encountered by market vendors in solid waste management. Based on the data above, most of the respondents encountered problems pertaining to Storage Facility Sanitation, Unavailability of food waste collector is the least problem. According to Kangasmaki (2020), solid waste management in the Philippines is still a major source of concern, particularly in urban regions like Metro Manila. Improper trash disposal, inefficient waste collection, and a lack of disposal facilities hinder the country's solid waste management. According to Fernandez (2020), 70% of the Filipino population lacks access to garbage disposal facilities and hygienic landfills, resulting in waste leakage into the oceans. The majority of incorrect rules for siting, construction, and management of new storage facilities, as well as lacking advice for viable upgrade alternatives of existing open dumps, are other reasons for poor disposal. If such issues are not addressed, the problem of solid waste management will continue to grow.

TABLE 4. Problems Encountered in Solid Waste Management in Santa Cruz Public Market, Davao del Sur

Rank	Problems	F	Rf (%)
1	Storage facility sanitation	17	8.72
2	Improper segregation, storing, disposal	15	7.70
3	Inadequacy of storage facility & segregation	13	6.67
3	Market sanitation	13	6.67
4	Unavailability of Market utility	12	6.15
5	Solid waste mgt. enforcement	11	5.64
5	Unscheduled collection of solid waste	11	5.64
6	Water supply or source	10	5.13
7	Presence of insects and pest	9	4.62
8	Storage Facility Distance	7	3.59
8	Lack of market solid waste mgt. awareness	7	3.59
9	Lack of market vendors cooperation	6	3.07
10	Clogging of drainage system	5	2.56
10	Costly	5	2.56
11	Garbage dumptruck	4	2.05
12	Unavailability of food waste collector	3	1.54
	NONE	47	24.10
TOTAL		**195**	**100**

Preferred Waste Reduce

Table 4.1 below, shows what commonly market vendors preferred waste to reduce. On table for reduce, market vendors preferred mostly plastic over other wastes and least on the rank is the metal having a frequency of 1 or 0.42%.

According to Fernandez (2020), the Philippines is the world's third largest polluter, after China and Indonesia, with 2.7 million metric tonnes of plastic trash generated each year. This merely demonstrates that the problems with plastic wastes overlap with those with other materials, which is why respondents selected to limit plastic trash output. Plastic garbage appears to be present in practically all waste streams. Other research have argued that the growing usage of plastics is due to changes in lifestyle and industrialization, with plastic packaging replacing other types of packaging (Azeez,2006). One respondent stated that among the wastes produced, plastic is hard to handle, unlike organic wastes that can be decomposed.

TABLE 4.1 Preferred Waste Reduce

Rank	Type of Waste	F	Rf (%)
1	Plastic	109	46%
2	Food waste	65	65%
3	Paper	31	13.08%
4	Cardboard	15	6.33%
5	Packaging	12	5.06%
6	Textile	2	0.84%
6	Wood	2	0.84%
7	Metal	1	0.42%
TOTAL		237	100%

Preferred Waste Reuse

Table 4.2, shows what most commonly market vendors preferred waste to reuse. Market vendors preferred mostly plastic over other wastes, having a frequency of 95 or 45.45, and least on rank is the metal having a frequency of 0 or 0.%. Roughly 10% of total waste generated by the

Philippines is plastic waste, according to a 2019 Phil Star article (Tinio, 2021).

Rank	Type of waste	F	Rf (%)
1	Plastic	95	45.45
2	paper	54	25.84
3	cardboard	41	19.62
4	wood	7	3.35
5	glass	6	2.87
6	textile	3	1.44
6	packaging	3	1.43
7	metal	1	0
TOTAL		**237**	**100**

Preferred Waste Recycle

Table 4.3, shows what most commonly market vendors preferred waste to recycle. Market vendors preferred mostly plastic over other wastes (47.1%), and least on rank is metal, while textile got 0% which means that none of the respondents prefer to recycle it. Plastic waste is a difficult material to dispose of, so it's wonderful that it's getting international attention (Tinio,2021). The classification of wastes produced is a crucial aspect and instrument in accomplishing the objective of proper waste management. Basic knowledge of trash separation at the source could have a positive impact in the community, both technically and financially.

Table 4.3 Preferred Waste Recycle

Rank	Type of Waste	F	Rf (%)
1	Plastic	97	47.1
2	Paper	52	25.24
3	Cardboard	40	19.42
4	Glass	7	3.40
5	wood	6	2.91
6	Packaging	3	1.45
7	Metal	1	0.48
8	textile	0	0
TOTAL		**237**	**100**

Relationship between Demographic Profile and Solid Waste Management

Table 5, shows the significant relationship between socio - demographic profile and their solid waste management. There is no significant relationship between respondents socio - demographic profile and their solid waste management. Regardless of the respondents socio - demographic profile, adaption of reduce, reuse, and recycle practices of solid waste management does not vary from age, gender, civil status, ethnic origin and number of years in business operation of the respondents.

Human behavior, as well as opinions about how these individuals interact with their surroundings, may play a significant role. Indeed, it has the potential to generate both positive and negative feedback, and it may alter over time. The respondents' constancy in adapting to this third habit is not solely determined by whether they are young or old, male or female, single or not, or whichever nationality they come from.

TABLE 5. Relationship between demographic profile and solid waste Management

Groups	*Count*	*Sum*	*Average*	*Variance*		
Age	5	18.76	3.752	0.10487		
Gender	2	7.59	3.795	0.09245		
Civil status	4	15.3	3.825	0.1467		
Ethnicity	6	22.42	3.73666667	0.60138667		
Adaption	6	18.64	3.10666667	2.37222667		
ANOVA						
Sourceof Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.96605116	4	0.49151279	0.55923996	0.6951119	2.927717
Within Groups	15.8200967	18	0.87889426			
Total	17.7861478	22				

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study on Adaption to Reduce, Reuse, Recycle (3Rs) Among Market Vendors in Santa Cruz Public Market, Davao del Sur was conducted to (1) determine the socio - demographic profile of market vendors in terms of age, sex, civil status and ethnic origin; (2) determine the adaption of reduce, reuse, recycle of the respondents socio - demographic profile ; (3) determine the problems encountered in solid waste management: (4) determine if there is a significant relationship between socio - demographic profile and solid waste management of the respondents.

The study was carried using a prepared survey questionnaire to 150 respondents in dry and wet market sections of Santa Cruz Public Market, Davao del Sur. Data gathered from the survey were subject to statistical tools which are, mean, relative frequency, standard deviation and analysis of variance (ANOVA).

Results disclosed that the ages of 38 - 47 years old was on top of the list in adapting the 3r practices of solid waste management, majority of them were female and most of them were married, it can as well be noticed that majority of the respondents were composed of Cebuano and been actively engaged in business operation for 5 - 15 years.

Results found that on adaption to 3R practices in terms of age, age group of 18 - 27 years old Often adapt, and the least were on the ages 28 - 37 years old tend to adapt Sometimes. On the adaption to 3r practices in terms of gender, male have the highest weighted mean of 4.01 or Often, and female have a mean of 3.58 or Often. Separated tend to adapt Often and and same with single individuals. Results also revealed that on the adaption to 3R practices in terms of ethnic origin, group of Tagalog market vendors Often adapt, while Boholano tend to adapt Sometimes. On the adaption to 3R practices in terms of number of years in business, those market vendors operating for 1 - 4 years Often adapt 3R, while 36 - 45 years Sometimes adapt.

Most of the problems pertaining to solid waste management were enumerated according to its rank. Majority of the market vendors have stated that the main problem highly involved in the storage facility sanitation, for the reason that some of the market vendors do not observe proper waste segregation, storing and disposing, this goes along with the inadequacy of storage facility, unavailability of market utility. One factor that gives rise to the occurrence of the enumerated problems were due to the lack of solid waste management enforcement, unscheduled collection of solid waste by the municipal LGU and the lack of water supply. Among this list were the presence of insects and pest in the public market, lack of market solid waste management awareness, and the distance of storage facility from there stalls. Another problem that market vendors listed is the lack of market vendors cooperation in solid waste management, clogging of drainage system specially during rainy seasons, they also find it very costly in a sense that they payed high on maintenance, and the issue of having inadequate garbage dump truck and the unavailability of food waste collector "lamaw". The lack of cooperation and integration between government and its people resulted to left this problem unsolve and even worsen. The reduce, reuse, recycle practices of solid waste management was not given priority by both entities. The problem can't only be solve by single entity alone it needs to have an integration and consistent implementation.

Results of the study also disclosed the preferred waste segregated of market vendors. Majority of the respondents preferred reducing plastic with a frequency of 31 or 13.08%, while last on the list was metal with a frequency of 1 or 0.42%. Highest solid waste that majority of the respondents preferred to reuse were still plastic with a frequency of 95 or 45.45% and still metal was the lowest, wherein none of the market vendors have chosen it. Highest solid waste that majority of the market vendor preferred to recycle was plastic with a frequency of 97 or 47.1% and the lowest was textile with an average weighted mean of 0 or 0%.

Conclusions

Based on the results and findings of the study, the researcher concludes that:

1. Most of the respondents are from the ages 38 - 47 years old, female and married, Cebuano in nature and been into business for 5 - 15 years.
2. Adaption to reduce, reuse, recycle (3R) practices in terms of age, ages group of 18 - 27 years old Often adapt, and 28 - 37 years oldSometimes adapt. On the adaption to 3r practices in terms of gender, male Often, and female have a mean of 3.58 or Often adapt. On the adaption to 3R practices in terms of civil status, separated individuals Often, and the least were those belong to single individuals with an average weighted mean of 3.51 or Often adapt. Results also revealed that on the adaption to 3R practices in terms of ethnic origin, group of Tagalog market vendors Often adapt, while Boholano Sometimes adapt. On the adaption to 3R practices in terms of number of years in business, market vendors operating for 1 - 4 years Often adapt, while 36 - 45 years Sometimes adapt was the least. As disclosed, most of the respondents practiced reduce, followed by recycle and last was reuse. Which oppose to the heirarchy of reduce, reuse, recycle practices of solid waste management.
3. Problems they commonly encountered in solid waste management involves, storage facility sanitation (8.72%), while unavailability of food waste collector (1.54%) was the least. Meanwhile 24% of them have

stated that they don't have problems on solid waste management.

4. There is no significant relationship between respondents socio –demographic and their solid waste management.

Recommendations

After careful analysis of the results, the researcher recommends that:

1. The local government of Santa Cruz, Davao del Sur should develop and establish an effective solid waste disposal system and services or facilities related to market hygiene and sanitation, such as putting up additional storage facilities or material recovery facilities near each market sections. The local government should also continue exercising its power appropriately relating to solid waste management enforcement and compliance. Programs related to solid waste management awareness will also help and adapting to 10 year solid waste management plan every 10 years will effectively achieve this goals.
2. The public market headed by its market vendors association President should initiate a regular collective organizational meeting for adequate communication of solid waste problems, future development plans and projects that will benefit the market operation and sanitation maintenance.
3. The market vendors should strictly follow proper solid waste management which involves proper segregation at source, storing and disposing. They should adapt more seriously on solid waste management practices such as providing garbage bin on their designated market sections emphasizing the type of garbages that should be disposed to carry out solid waste management services effectively.
4. Adaption of 3r practices mainly reduce, reuse, and recycle schemes should be undertaken not only by market vendors alone, but by market consumers and community as well, thus it is necessary that the local government of Santa Cruz, Davao del Sur to formulate and establish an amendments or an ordinance consistent with national law pertaining to solid waste management regulations and creating liability.
5. The market staff along with the market associations officers should conduct a market clean-up, rehabilitation, and preservation program annual reports to show that despite the increase in establishments, market stalls, and other commercial buildings, the market still have an adequate waste treatment facilities, septic tanks, and proper drainage system. This includes annual problems encountered by market vendors.
6. The local government of Santa Cruz must develop a policy that can aid implementation of waste minimization. The aim of this is to shift management costs from the municipality to the business owners, so they internalize solid waste management disposal costs.
7. The local government, in collaboration with its local agency, should raise market vendor awareness, understanding, and competency to be able to abide the practice of reducing, recycling, and reusing garbage, as well as properly dispose of it, as part of their routine day-to-day operations at the public market. This can be achieved by holding a solid waste management awareness campaign.

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