Chapter i

Environment, Pollution

Chapter I THE PROBLEM AND ITS BACKGROUND Introduction One of the most common topics that are being talked about aside from the economic and political issues is environmental issue. Solid Waste is one of the most widely known problems that the earth is encountering. It is not just a problem in this country but also to other countries as well. There are a lot of studies and invention created to solve the environmental issues, specifically the waste management problem. Solid waste problem is the number one cause of today’s issues and destruction of ecosystem. People can be ill by exposing themselves to hazardous waste in the environment; many of these are linked to environmental problems such as expose to mosquitoes, polluted drinking water and poor waste disposal. The need for solid waste management is now a growing problem due to continuous increase in population and industrial production. Philippine homes, businesses and industry generate millions of tons of solid waste annually. While landfill disposal continues to be an option, new disposal facilities face strong public examination and are costly to site, build and operate. The department is constantly seeking alternatives to landfill disposal that are both environmentally protective and cost-effective for the consumer. Solid waste management permitting, monitoring and enforcement efforts can prevent illegal dumping and other factors that may cause long-term social, economic and environmental problems. Cabanatuan city is a first class city in the province of Nueva Ecija. As of now it is considered the commercial, industrial and educational hub of the province and also known as the “ Tricycle Capital of the Philippines". The increasing growth of garbage brought some health problems. The city is implementing some ordinances to combat such problem, one there is the so called “ ZERO

BASURA", which can reduce the amount of garbage generated. To implement such ordinance, a program was launched “ ADOPT A BARANGGAY PROGRAM". It is open to all 89 baranggays of Cabanatuan City. With the leadership of the Baranggay Captains a Baranggay Solid Waste Management Committee was established. In implementing the program, each baranggay will conduct rural gardening, compost making, as well as continuous advocacy training on waste management, clean and green and livelihood training seminars which among the activities undertaken and still on-going projects of each baranggay. The said activities were clearly stipulated in RA 9003 known as “ The Ecological Solid Waste Management Act of 2000". But it is still a question of requirements undertaken by the program if is successfully implemented. Thereby, it is deemed necessary to conduct the study “ Effective Solid Waste Management Trough Adopt a Baranggay Program in the Rural and Urban Areas in Cabanatuan City: A Comparative Analysis" Statement of the Problem The study aims to evaluate the “ Adopt a Baranggay Program Program" of the local government unit of cabanatuan city in their selected rural and urban areas. Specifically, the study will answer the following questions: 1. How may the profile of the respondents be described in terms of: 1. 1 Age 1. 2 Gender 1. 3 Civil Status 1. 4 Educational Attainment 1. 5 Government Position 2. How may the Adopt a Baranggay Program of LGU Cabanatuan be describe in terms of: 2. 1 Composition of the Baranggay Solid Waste Management Committee. 2. 2 Composition of the Solid Waste Management Plan. 2. 3 Best Pratices 3. How may the “ Adopt a Baranggay Program" is being implemented for the said baranggays (rural and urban areas) in terms of: 3. 1 5 R’s (Reuse, Reduce, Recycling, Refuse

and Recover) 3. 2 Rural Gardening 3. 3 Material Recovery Facility (MRF) 3. 4 Compost making, 3. 5 Continuous advocacy training on waste management, 3. 6 Clean and green and livelihood training seminars 3. 7 Barangay Solid Waste Management Committee 4. Is there any significant difference in the implementation of the Adopt a Baranggay Program between the rural and urban baranggays? 5. What is the impact of “ Adopt a Baranggay Program to the environment? Significance of the Study The study aims the importance of segregating waste and implementing the “ Adopt a Baranggay Program" in the urban and rural areas in Cabanatuan city with the following beneficiaries: The Residents of Cabanatuan — This research can be a useful tool to level up the awareness about the waste that they are producing. The Municipal Administrators — This study will benefit the municipal administrators in such a way that this will serve as additional information on determining some various effects of this waste in their community. The Baranggay Captain — this study will benefit the Baranggay Captain in a way that this will serve as additional information on some effects of hazardous waste on them if not disposed properly. The Researcher — this research provided us with firsthands experience in conducting research along our field of interest and specialization. Such experience could take us further along our chosen career. Students and other Researchers — this research will surely be of benefit to other students and researchers as it may provide them with additional reference for their future researchers. Likewise those who are still aspiring to do research may gain useful insight from the output of this research study. Scope and Delimitation This study entitled “ Effective Solid Waste Management through Adopt a Baranggay Program in the Rural and

Urban Areas in Cabanatuan City: A Comparative Analysis" focused in determining if the certain baranggays in Cabanatuan City are implementing the “ Adopt a Baranggay Program" and to know the effects of improper segregation of this waste in our environment. This study will be conducted at Cabanatuan City, Nueva Ecija on October 2012 with the eighty nine different urban and rural areas and will be completed on December 2013. An interview of the respondents will be conducted as a part of the documentation of the results. Conceptual Framework In order to conceptualize the study, the Input, Process and Output system will be used. Figure I illustrates the research paradigm. The Input box represents the primary data of the study wherein doing an actual interview with the respondents and the secondary data is the material document coming from the city government. The process box shows data analysis and data interpretation, while the Output box are the baseline data, the probable outputs of the study namely “ Effective Solid Waste Management through Adopt a Baranggay Program in the Rural and Urban Areas in Cabanatuan City". Input Process Output * “ Effective Solid Waste Management through Adopt a Baranggay Program in the Rural and Urban Areas in Cabanatuan City" 1. Data collection * Mapping * Data analysis * Data interpretation * Questionnaire construction 1. Primary Data * Actual interview to: * Baranggay Captain * Barangggay Solid Waste Management Committee * Chief of the City Solid Waste Management Board (CSWMB) * EPD 2. Secondary Data * Material document coming from the City Government. Figure 1 Research Paradigm Definition of Terms In order to attained common understanding. The following terms were operationally defined: Ecological

Solid Waste Management - Shall refer to the systematic administration of activities which provide for segregation at source, segregated transportation, storage, transfer, processing, treatment, and disposal of solid waste and all other waste management activities which do not harm the environment. Sanitary landfill - is the cheapest satisfactory means of disposal, but only if suitable land is within economic range of the source of the wastes; typically, collection and transportation account for 75 percent of the total cost of solid waste management. Agricultural waste - shall refer to waste generated from planting or harvesting of crops, trimming or pruning of plants and wastes or run-off materials from farms or fields. Bulky wastes - shall refer to waste materials which cannot be appropriately placed in separate containers because of either its bulky size, shape or other physical attributes. Household Hazardous Waste - Ordinary products such as paint thinner, pesticides, gasoline and motor oil can be dangerous if handled improperly. When these products are not used up completely or are no longer wanted by the consumers, and need to be discarded, they become a HHW. Composting - shall refer to the controlled decomposition of organic matter by micro-organisms, mainly bacteria and fungi, into a humus-like product. Materials recovery facility - includes a solid waste transfer station or sorting station, drop-off center, a composting facility, and a recycling facility. Open dump - shall refer to a disposal area wherein the solid wastes are indiscriminately thrown or disposed of without due planning and consideration for environmental and Health standards. Chapter II REVIEW OF RELATED LITERATURE This chapter presents the different literature reviewed in the study. Related Literature Solid Waste Management According to Both (2006),

Solid waste management is a well-bred terminology that refers to garbage or trash management. As long as humans have been living in settled communities, improper waste management has always been an issue. Industrialized nations can generate pounds of solid waste per consumer thus making it a big problem for the world’s undying waste destitution. Waste problem being one of the foremost and mounting problems in other countries have been hazardous not only on human’s health but also causes depletion for lands which is why solid waste management was generated. It is a system for handling all of the world’s trash, be it municipal waste collection, recycling programs, dumps and incinerators. Adopt a Baranggay Program Is a program that was launched by the city of Cabanatuan to minimal their waste. The program is clearly stipulated in RA 9003 known as Ecological Solid Waste Management. Each baranggay will conduct rural gardening, compost making, as well as continuous advocacy training on waste management, clean and green and livelihood training seminars which among the activities undertaken and still on-going projects of each baranggay. Cabanatuan City The City of Cabanatuan is a first class, partially urban city in the province of Nueva Ecija, Philippines. It is considered the commercial, industrial and educational hub of the province. According to the latest census, it has a population of 259, 267 people in 45, 424 households which makes it the largest city in the province and fifth all over the region. In terms of income and economic growth, Cabanatuan is one of the fastest-growing cities in the country. It has a metropolitan population of +500, 000. It's a bustling city home to many jeepneys and tricycles. It bears the title as the " Tricycle Capital of the Philippines", because it has about over 38, 202

(as of September 2009) registered tricycles. (Wikipedia) Urban Area An urban area is the region surrounding a city. Most inhabitants of urban areas have non-agricultural jobs. Urban areas are very developed, meaning there is a density of human structures such as houses, commercial buildings, roads, bridges, and railways." Urban area" can refer to towns, cities, and suburbs. An urban area includes the city itself, as well as the surrounding areas. Rural Area A rural area is an open swath of land that has few homes or other buildings, and not very many people. A rural area’s population density is very low. In a rural area, there are fewer people, and their homes and businesses are located far away from one another. Agriculture is the primary industry in most rural areas. Most people live or work on farms or ranches. Hamlets, villages, towns, and other small settlements are in or surrounded by rural areas. (education. nationalgeographic. com/encyclopedia) Comparative Analysis A study by Weld (2001), Comparative analysis answers questions about how and why a system will react to perturbations of its parameters. For example, comparative analysis can explain why the period of a spring/block system would increase if the mass of the block were larger. This paper formalizes the problem of comparative analysis and describes a solution technique, differential qualitative analysis; the technique only works if the system can dynamically change perspectives when it compares the values of parameters over intervals. This paper shows how perspectives can be used for comparative analysis, summarizes a soundness proof for the technique, demonstrates incompleteness, describes a working implementation, and presents experimental results. Related Studies A study by Paul, et. al.(2011), showed

that Related to modernization, development and changes of lifestyles, E-Waste generation becomes an emerging issue for all municipalities in the Philippines. However, the steadily increasing E-goods import and application are not reflected in the SWM legislation yet. So far, most of E-Waste either ends up at local dumpsites or is treated by the informal sector, whereas the latter lacks knowledge and tools to perform recycling and waste treatment in a proper manner. Consequently, a significant portion of E-Waste is lost and creates negative impacts on the health of waste workers and the environment. The conducted research revealed an immense potential for future E-Waste generation in Metro Cebu, whereby the households itself may become the main E-Waste generator. But to implement EWM in Metro Cebu, local decision makers and involved authorities need to be made aware of this issue first. To clarify roles and tasks of involved stakeholders and to provide standard procedures it is recommended to draft and implement a local ordinance for E-Waste management at the soonest. To support this process, further research should be conducted by local academe to develop needed monitoring tools and to support joint learning for involved stakeholders. A study by Quiroga1, et. al.(2001), showed the impact of the project implementation on the two groups through the Sustainable Livelihood Approach, in presenting the measures applied, the reaction of the affected groups, and the changes in their respective livelihood assets. San Carlos, a small city in the Philippines, implemented a SWM system to improve the environmental and health situation in the commune. However, the over-all beneficial closure of the open dumpsite also meant the loss of the livelihood activities of many informal waste pickers. The government has recognized

the skills of these people and hired some of them as workers in the new waste processing center, but the remainder was left without a source of income and employment perspectives. According to Naz, et. al. (2009), improper solid waste disposal is probably the most important environmental concern facing local governments (Laplante 2003). This is particularly true in the Philippines (World Bank 2001). in response to a garbage crisis, the first bill that Philippine President Gloria Macapagal-Arroyo signed into law in 2001 was Republic Act No. 9003 (RA 9003) or the Ecological Solid Waste Management (ECOSWAM) Act which requires municipalities to dispose of waste in a sanitary and environmentally friendly manner. According to Perez (2011), if there is one thing that True Green Energy Group and Spectrum Blue Steel Corporation wanted for the Philippines this 2011 that is to achieve zero waste society. This is a one simple vision for the country which can greatly help save the Philippine environment. The first step that TGEG and SBSC have taken into action is landfill-avoidance through deployment of biosphere gasification facilities in various cities and municipalities in the Philippines. The campaign has already started in City of San Fernando Pampanga, where the first biosphere facility is being constructed. The biosphere technology is designed to convert waste materials into marketable products like green energy or electricity. By the time the biosphere gasification facilities are finished the environmental problems brought by inefficient waste management and energy problems will be resolved. According to Enriquez (2011), the government of the Philippines has been keeping an open eye about the country's waste management problem. The nation's supervision towards the end of this mounting dilemma is to build

biosphere facility sites to every municipality nationwide, facilities which diminish waste to generate green energy. This is a project of TGEG — SBSC, a joint venture to every local government officials in achieving a zero waste society. Sindalan, San Fernando Pampanga is one of the few municipalities in the Philippines that established their own recycling facility. Say the opposite , the City of Pines, Baguio City. The used to be cleanest and greenest city in the Philippines now stinks because of their unwanted garbage problem. The city of pines is experiencing this major destitution because of landfill deprivation. They are even experiencing fund draining due to the transport or garbage of every municipality. Hauling of their waste to other cities have caused them subsidize financial support. According to Kets (2011), industrial waste is one issue that is a big concern for waste management in Australia and specialised environmental services have the ability to provide complete management solutions for industrial clients. Their focus is on finding and putting into operation inventive, successful, and sustainable waste solutions, many have become industry leaders in this area dealing with all aspects of resource recovery and waste management, including industrial cleaning and facilities management. They provide industrial cleaning experts on site that can give advice and information to businesses and industries on the most efficient cleaning solutions, this could be anything from high pressure water jetting, vacuum loading and tank cleaning, to drain and sewer cleaning, sludge management, catalyst handling, and asbestos removal. According to Wanless Enviro (2009), Waste Management flows in a cycle: Monitoring, Collection, Transportation, Processing, Disposal / Recycle. Through these steps a company can

effectively and responsibly manage waste output and their positive effect they have on the environment. In conclusion, waste management is a science that addresses the logistics, environmental impact, social responsibility, and cost of an organization’s waste disposal. It is a detailed process that involves human resources, vehicles, government bodies, and natural resources. A study by Beede, et. al.(2007), showed that practices for collecting, processing, and disposing of municipal solid waste vary widely across countries, generally in accord with the nature of the waste stream and key environmental and economic features. The least efficient practices tend to be found in developing countries, creating serious threats to local environmental quality and public health The authors' calculations also suggest that improvements made now in the handling of hazardous waste will be far less expensive in discounted terms than undoing in the future the damage being caused by current practices. Addressing these issues from a rational societal perspective will become increasingly urgent in the future, especially in the developing countries, where the authors project that municipal solid waste will increase at an annual rate of 2. 7 percent through the year 2010. A study by Seng, et. al. (2010), showed the problems with the current MSWM are identified, and challenges and recommendations for future improvement are also given in this paper. MPP is a small city with a total area of approximately 374 km2 and an urban population of about 1. 3 million in 2008. For the last 14 years, average annual municipal solid waste (MSW) generated in MPP has increased rapidly from 0. 136 million tons in 1995 to 0. 361 million tons in 2008. The gross generation rate of MSW per capita was 0. 74 kg day-1. However, the per capita household waste

generation was 0. 487 kg day-1. At 63. 3%, food waste is the predominant portion of generated waste, followed by plastics (15. 5%), grass and wood (6. 8%), and paper and cardboard (6. 4%). The remaining waste, including metals, glass, rubber/leather, textiles, and ceramic/stone, accounted for less than 3%. Waste recycling through informal sectors is very active; recycled waste accounted for about 9. 3% of all waste generated in 2003. Currently, the overall technical arrangement, including storage and discharge, collection and transport, and disposal, is still in poor condition, which leads to environmental and health risks. These problems should be solved by improving legislation, environmental education, solid waste management facilities, and management of the waste scavengers. According to Zafar (2010), There are numerous solid waste gasification facilities operating or under construction around the world. Gasification has several advantages over traditional combustion processes for MSW treatment It takes place in a low oxygen environment that limits the formation of dioxins and of large quantities of SOx and NOx. Furthermore, it requires just a fraction of the stoichiometric amount of oxygen necessary for combustion. As a result, the volume of process gas is low, requiring smaller and less expensive gas cleaning equipment. The lower gas volume also means a higher partial pressure of contaminants in the off-gas, which favours more complete adsorption and particulate capture. Finally, gasification generates a fuel gas that can be integrated with combined cycle turbines, reciprocating engines and, potentially, with fuel cells that convert fuel energy to electricity more efficiently than conventional steam boilers. A study by Brown (2009), one of the most important pieces of data resulting from a waste audit is the

diversion rate. The diversion rate is the percentage of material generated from an event that is being diverted away from a landfill. A high diversion rate means that most of the waste generated by the event is staying out of the landfill. An event with a 100% diversion rate is considered to be zero-waste. If composting and recycling is an option at your event then a diversion rate between 65-75% should be easy. With proper planning and an educated staff, a diversion rate of 75-85% percent would be quite good. A rate above that, approaching true " Zero-Waste" or 100% diversion, would take full cooperation of event planners, staff, and participants, and would be considered outstanding. A study by O’Neill (2010), Restaurants pushing toward zero waste focus on decreasing their waste wherever possible and then diverting all remaining waste toward recycling & composting environments. To achieve this, I've seen these food service businesses combine three major tactics: a) Eliminating All Non Recyclable And Non Compostable Waste - I have found that a variety of our generations eco-friendly bistros and cafes effectively do away with all waste that can't be composted or recycled. For outbound packaging supplies (ones used by consumers), lots of restaurants have shifted over to compostable food packaging (e. g., biodegradable cups, biodegradable plates, compostable utensils, biodegradable containers). B) Eliminating Trash Cans - I have seen a number of eco-minded business owners we work with eliminate or drastically decrease the size of their trash can. This seems to be a very powerful strategy so long as you've already applied #1 and reduced most of your plastic packaging to things like biodegradable cups and biodegradable plates. And c) Staff Education - I've found that businesses that are the best

at getting to zero waste take significant effort to educate their staff on effective recycling techniques, composting practices, and the use of re-usables. A study by Chandra, et. al. (2009), showed that the problem of municipal solid waste management (MSWM) is also prevailing in the urban environment of Mysore. Therefore the present study was taken to find out the problems and prospects of Municipal solid waste in Mysore city. A detailed investigation was made regarding the methods of practices associated with sources, quantity generated, collection, transportation, storage, treatment and disposal of Municipal solid waste in Mysore city. The data concerning to SWM in Mysore was obtained through questionnaire, individual field visit, interacting with people and authentic record of municipal corporation. Photographic evidences were also made about generation, storage, collection, transportation, treatment and disposal of MSW. This study reveals that the present system of MSWM in Mysore city is not satisfactory based on Municipal Solid Waste (Management & Handling) Rules 2000. A study by Sessa, et. al. (2009), showed that a self-administered questionnaire investigated knowledge, perceptions of the risks to health associated with solid waste management, and practices about waste management in a random sample of 1181 adults in Italy. Perceived risk of developing cancer due to solid waste burning was significantly higher in females, younger, with an educational level lower than university and who believed that improper waste management is linked to cancer. Those who more frequently perform with regularity differentiate household waste collection had a university educational level, perceived a higher risk of developing cancer due to solid waste burning, had received information

about waste collection and did not need information about waste management. Educational programmes are needed to modify public concern about adverse health effects of domestic waste. A study by Kaluli, et. al. (2010) showed that integrated solid waste management includes source reduction, source separation, recycling and reuse as well as materials recovery. The waste materials that remain should be safely disposed into a sanitary landfill. Up to 2010 when this study was done, no Kenyan city had a sanitary landfill and solid waste piles along inner city streets was a common sight in Nairobi. This study found that the solid waste in Juja consisted of 80% food and other organic wastes, 10% plastics, 2% metal and glass, and 3% mixed refuse. The waste had a very low level of toxic substances. The majority of the households produced less than 3 kg per day, which translated to less than 0. 5 kg/person/day. JKUAT-SWMM, a solid waste management model developed in this study, suggested that if 25% of the population would do composting using household compost digesters of 288 L, the area of a disposal site required for 1 million people would be 16 ha. The identified site was on fallow land that received an annual rainfall of 600-800 mm. A waste disposal facility in Juja Farm could cater for most of the towns in the area of interest, including Juja, Mangu, Kimunyu, Gatundu, Thika, Ruiru and Kahawa. A study by Penjor (2007), showed that in Thimphu, the capital city, the conventional system of collecting, transporting and disposing the MSW initiated in 1993 is ongoing. There has been not much improvement or changes in the system over the years. The collected wastes is transported and dumped at Memelakha, an open site about 10 kilometers away from the downtown. Around 80, 000 people live in the 26 square kilometers city area

of Thimphu, which stretches from Chantagang in the north to Ngabi Rongchu in the south, fanning on Thimphu River. The Thimphu City Corporation (TCC) is solely responsible for managing the MSW of Thimphu city. It has limited resources, manpower and facilities. Public responsibility sharing and specific waste management institutional tools also are limited. This study therefore aims to analyze management gaps in the present urban solid waste management system of Thimphu and identify 3R options, mainly applicable low cost policy options. Anything that improves the situation in Thimphu should be applicable to other urban settlements in Bhutan as Thimphu is the capital and the biggest urban settlement. A study by Ayotamuno, et. al. (2004), showed that The situation is so bad that traffic flow is obstructed, while there is likelihood that leachates from such dumps, after mixing with rain water, have the potential to contaminate drinking water. The basic solid waste management processes of collection, transport, segregation and final disposal appear to be very inefficient. This research carefully assessed the present system of solid waste management in Port Harcourt, with the aim of identifying the main bottlenecks to its efficiency and the way forward. The subject matter of solid waste management is the main object of discussion throughout this article. A study by Gador (2009), showed that the study, conducted at the 72 barangays and 78 micro, small, and medium enterprise/industries of the three districts of Davao City last April — July 2009, delved into an analysis of the city’s solid waste management. The major focus was on the solid waste management practices of Davao City through the use of descriptive research method. The result of the survey was validated through focused group discussion from selected barangays.

Documents from the CENRO, City mayor’s office and Sangguniang Panglungsod were analyzed. In conclusion; the technical, financial, and organizational & management factors were involved in the solid waste management practices in Davao City. A study by Gallardo, et. al. (2012), showed that the study looks at the systems and their efficiency by means of the indicators fractioning rate, quality in container rate and separation rate. The results obtained are compared with those from a similar study conducted earlier that was applied to towns and cities with populations over 50, 000. It can be concluded that the most widely implemented system in Spain involves the collection of mixed waste from kerbside bins and picking up paper/cardboard, glass and lightweight packaging from drop-off points. Findings show that the best system is the one that collects mixed waste, organic material and multiproduct waste door-to-door, and glass from drop-off points. The indicator separation rate made it possible to establish beta regression models to analyse the influence of the following logistic variables: inhabitants per point (people/pt), time (years) and frequency of collection (freq). From these models it can be seen that people/pt has a negative effect on all the fractions, while freq and years have a positive effect in the case of paper. A study by Corvellec, et. al.(2012), showed how the business model of two leading Swedish municipally owned solid waste management companies exposes them to four different but related markets: a political market in which their legitimacy as an organization is determined; a waste-as-material market that determines their access to waste as a process input; a technical market in which these companies choose what waste processing technique to use; and a commercial market in which they market their products. Each

of these markets has a logic of its own. Managing these logics and articulating the interrelationships between these markets is a key strategic challenge for these companies. A study by Grill, et, al, (2012), showed The biodrying process of solid waste is a pre-treatment for the bio-stabilisation of the municipal solid waste. This study aims to investigate the fate of the municipal solid waste fine fraction (MSWFF) resulting from a biodrying treatment when disposed in landfills that are operated as bioreactors. Biodried MSWFF was apparently stable due to its low moisture content that slows down the microbial activity. The lab-scale anaerobic bioreactors demonstrated that a proper moisture content leads to a complete biodegradation of the organic matter contained in the biodried MSWFF. Using a pilot-scale landfill bioreactor (LBR), MSWFF stabilisation was achieved, suggesting that the leachate recirculation could be an effective approach to accomplish the anaerobic biodegradation and biostabilisation of biodried MSWFF after landfilling. The biostabilisation of the material resulting from the LBR treatment was confirmed using anaerobic and aerobic stability indices. All anaerobic and aerobic indices showed a stability increase of approximately 80% of the MSWFF after treatment in the LBR. The similar values of OD7 and BMP stability indices well agree with the relationship between the aerobic and anaerobic indices reported in literature. Comparison of the Previous and Present Study The previous studies were focused on the development of the implementation of RA 9003 “ Ecological Solid Waste Management" to obtain some goals such as Zero-Waste to every country. It also provided some background information in the present study. There are no differences between the previous studies and the present

study. The only thing that differs in the present study is the comparison of such identified program between the urban and rural baranggay. However, the impact of the program will be properly evaluated and analyzed. Chapter III METHODOLOGY This chapter present the research method that will be used in the study. The research environment, the procedural steps to be used in conducting the study. The sources of data and the statistical tool or analysis to be applied. The Research Method The research methods that will be used in this study are the descriptive and comparative method. Descriptive comparative method is intended to figure out the basic answer towards causality aspect by analyzing the factors that causes certain phenomenon Nazir (2006). Further, Roberts (2006) states that a comparative method is the quickest way to get at the essence of one thing is to compare it with something else that is similar. The Research Environment The research environment will be the 89 different baranggays (urban and rural) of Cabanatuan City. (See Appendix A) Sources of Data The sources of data that will be used in this study are the selected respondents from different baranggays of Cabanatuan city where the program is being implemented. The researcher also utilized as respondent the City Solid Waste Management Board (CSWMB). The respondents of the study will be the Baranggay Captain of each baranggays and their Solid Waste Management Committee. This means that the respondents were fully represented by people who could rightfully become source of valid information concerning the research questions at hand. Procedural Steps in Conducting the Study 1. Collection of documents for data input from: 1. 1 LGU’s; Initiative program 1. 2 Baranggay Captain 1. 3 Barangggay Solid Waste Management Committee 1. 4 Chief of

the City Solid Waste Management Board (CSWMB) 1. 5 EPD 2. Gathering of documents which serve as an input for the proposed program. 3. Finalization of the proposed “ Adopt a Baranggay Program" on solid waste management. Flowchart of Activities To validate the instrument, copies of the questionnaires will be distributed among the respondents who were ask to accomplish the questionnaires. The accomplished questionnaires will be collected and responses will be tallied later to see if it would yield answer to the problem at hand. Necessary revisions of the questionnaires will be made based on the assistance and a suggestion of experts before the questionnaire will be finalized. Flowchart of Activities Planning and Conceptualisation Instrument/Questionnaire formatting Validating and Testing Instrument Feeding Normative Survey Data Gathering C. S. W. M. B. and E. P. D. Respondents from Cabanatuan City Evaluation of the gathered data Comparative Analysis of Data Data Interpretation Figure 2 Flowchart of Activities Statistical Treatment of Data The formula that will be used in describing the data gathered will be the following: 1. Percentage (%) = f/n 100 Where: f = number of respondents n = total number of the respondents % = percentage of the respondents 2. The weighted mean. The mean is regarded as the best measure of central tendency showing the point in the scale, which the scores tend to grouped together. It is value, which presents the whole distribution (Estollas and Borquirren, 1973). It was used in this study to determined the description of the evaluation of “ Adopt a Baranggay Program". Formula: x = âˆ‘ N Where: X = Mean âˆ‘ = The sum of the scores X = Raw score in a set of score 3. In order to test the significant differences between and among all treatments, Analysis of Variance (ANOVA) was used.

According to Deveza (1996), ANOVA is the modern statistical treatment used to analyze data. Table I ANOVA SV | Df | SS | MSS | F | Between | DFbet | SSbet | MSSbet | Fc | Within | DFwit | SSwit | MSSwit | | Total | DFtotal | SSTotal | | | Where: Column 1 SV — sources of variation Between — variation between groups Within — variation within groups Total — sum of all variation `Column 2 DF — degree of freedom DFbet — between groups, degrees of freedom DFwit — within groups, degrees of freedom DFtotal — total degrees of freedom Column 3 SS — sum of squares SSbet — within groups, sum of squares SSwit — within groups, sum of squares SStotal — Total degrees of freedom Column 4 MSS — mean of sum of squares MSSbet — between groups, mean sum of squares MSSwit — within groups, mean sum of squares MSStotal — total degrees of freedom Column 5 F — f-statistic FC — computed value of f-statistics To be able to quantify responses given by the respondents, a 5- point scale described as follows was used to give equivalent weight to each response; a) Waste Management Practices of the respondents Description of weighted mean 4. 0 — 5. 0 = Always 3. 0 — 3. 99 = Frequent 2. 0 — 2. 99 = Sometimes 1. 0 — 1. 99 = Seldom Below 1. 0 = Never b) “ Adopt a Baranggay Program" as to Materials Recovery Facility (MRF), Composting, Organic Gardening, Mini Forest and proper segregation of garbage. 4. 0 — 5. 0 = Good 3. 0 — 3. 99 = Fair 2. 0 — 2. 99 = Poor 1. 0 — 1. 99 = Not Yet Existing REFERENCES Journals and Articles Antonia and Mario Naz (2009); ASEAN Economic Bulletin Ayotamuno and Gobo (2004); Municipal solid waste management in Port Harcourt, Nigeria: Obstacles and prospects Both (2006); Waste management for a modern world Beede and Bloom (2007); Effective municipal solid waste management Brown (2009);

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