



**NATIONAL COLLEGE OF BUSINESS AND ARTS
FAIRVIEW, QUEZON CITY CAMPUS**

**USE OF GARLIC AND ONION PAPER IN ADDRESSING WASTE
MANAGEMENT PROBLEMS**

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April 2025

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1.0 Introduction

One of the most consumed spices in the world are garlic and onions, and a large amount of waste is generated from garlic and onion peels. These are discarded into the environment and produce a significant amount of garbage from the peels of garlic and onion. The researchers made a Garlon (combined word of garlic and onion) Paper that reduces and utilizes waste, which is an eco-friendly product that provides environmental sustainability, and might lessen waste management problems. The garlic peels and onion skins can be mixed together and reused as an alternative paper for decoration purposes such as in scrapbooks as a vintage paper, alternative writing paper, and even packaging that may also potentially solve problems in waste management such as segregation of waste specifically recyclables, land pollution, and waste buildup. On the other hand, according to University of California Integrated Pest Management in 2025, garlic and onion are plants that only take 120 days or more to mature. Onions and garlic grow fast and can be harvested annually, unlike trees that take 10 to 40 years to grow (Bowman, 2025). Garlon Paper is also a biodegradable product that will break down naturally without polluting the environment, unlike products made out of plastic and common paper production that contribute to waste management problems.

Waste management leads to direct and indirect environmental impacts, such as land occupation, resource depletion, water intoxication due landfilling, acidification and toxic effects from emissions to air in the case of incineration or burning. Any material, whether solid, liquid, or gaseous, that is being disposed of are considered waste. Waste includes materials derived from production processes or commercial goods that are no longer functional and have become outdated. Direct impacts of waste represent a significant but comparatively small share of climate change, while resource depletion among similar effects is linked to indirect environmental impacts. This is mainly because indirect results of wastes are linked with the extraction and processing of different resources to produce different types of products while focusing on the output rather than the input in many industries. This demonstrates how, in comparison to its equivalent, the indirect effects of improper waste management can be more disastrous and have the greatest potential. The various methods and techniques created and put into place to recognize, regulate, and manage the various kinds of garbage from production to disposal are referred to as waste management (Mubaslat, 2021).

The purpose of this study is to show how repurposing food waste like onion skins and garlic peels can contribute to effective waste management practices, reduce environmental impacts, and provide a biodegradable solution for packaging and creative applications. The goal of this study

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is to investigate the potential of using onion and garlic waste as an eco-friendly alternative material for paper production, specifically the development of Garlon Paper. Furthermore, in many developing countries, street vending is a major source of income, particularly for poor urban migrants who lack access to formal employment, skills, and education. Although street vending plays a significant role in poverty reduction and job creation, it often goes hand-in-hand with challenges such as inadequate infrastructure, poor waste management practices, and insufficient dumping facilities (Ezeudu et al., 2021). Additionally, understanding the interest of the students when it comes to waste management and repurposing garlic peels and onion skins will greatly help in gaining both vendors' and students' knowledge, and engagement in contributing to a good environment.

2.0

Background

2.1 Theoretical Framework/Conceptual Framework

The study and Garlon Paper product is anchored on the Zero Waste Theory of Dr. Paul Palmer in 1973. The Zero Waste Theory states that all goods must be designed for reuse, not for discard. It is an approach to life that encourages individuals to reduce the disposal quantity of materials and instead repurpose it. According to International Alliance Board, the Zero Waste defined as a philosophy and visionary goal that emulates natural cycles, where all outputs are simply an input for another process that means designing and managing materials and products to conserve and recover all resources and not destroy or bury them and eliminate discharges to land, water or air that unproductively to natural systems or the economy. This theory also concludes that the term "waste" does not exist in nature. In nature, a system's products on the planet are a resource for a new purpose (Near East University Journal of Education Faculty, 2022).

2.2 Literature Review

2.2.1 Local Literature and Studies

Here are some articles, and journals in the Philippines discussing about the waste management:

Managing Market Waste for use in Urban Gardening in Metro Manila

According to an article written by Hannah Graham, a student intern from Consultative Group on International Agricultural Research Resilient Cities Initiative Philippines, the Philippines

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has been facing an escalating challenge in ecological waste management. In the year 2000, this critical issue prompted the Philippine government to introduce the Ecological Solid Waste Management Act of 2000 (RA 9003) to address the mounting waste crisis and reshape the nation's approach to waste collection, disposal, diversion, and recovery. As a testament to the urgency of this problem, national statistics indicate that a significant portion of waste generation in the Philippines originates from households and local markets. Waste generation primarily consists of biodegradable and seemingly "recyclable" materials. The presence of biodegradable and recyclable waste in these markets is an opportunity to divert these materials from conventional landfill disposal, which is both environmentally harmful and unsustainable. (Graham, 2023).

Waste Management is a Collective Responsibility; Contribute your Share for a Healthier Environment

According to an article from the Manila Bulletin, waste management is a collective responsibility as the Philippines' material recovery facilities, which were only 11,625 counted, only covers 42,029 barangays in the Philippines, as well as 27 sanitary landfills servicing 1,634 cities and municipalities. After the results of the Typhoon Carina with a recorded 1,500 tons of garbage that highlighted the country's current waste management crisis. The recorded number of waste management facilitations by the article underscores the need for a more concerted effort from the government and every individual to tackle this pressing issue by asking the government to lead for the country as an example. The article addresses the waste problems and the country's lack of enthusiasm for proper waste management, and explains that it is a united effort that must have the full support of the citizens by implementing management laws. Apart from the government and private sector, every individual has a role to play to address the garbage crisis. Simple acts such as segregating waste at home, recycling and reuse, reducing plastic use, and participating in community clean-up drives can collectively make a significant difference. Education and awareness campaigns are essential to instill a sense of responsibility and urgency among citizens. (Manila Bulletin, 2024).

Here are some articles and journals in the Philippines discussing discussing about the garlic and onions:

DA vows to address soaring retail prices of imported garlic

According to an article from the Philippines News Agency, the Department of Agriculture (DA) is considering imposing a maximum suggested retail price (MSRP) on garlic to curb potential

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profiteering, Agriculture Secretary Francisco P. Tiu Laurel said. The Philippines imports approximately 95 percent of its garlic supply that is being sourced from China, while the remaining 5 percent comes from local production. The Philippines can only produce around 1 to 2 tons of local garlic per hectare, according to the DA. The Secretary of the Department of Agriculture, attributed the challenges to the need for more temperate weather and the lack of innovative planting materials. However, the Department of Agriculture assured support for garlic-producing areas, including the Ilocos region as Region 1's Ilocos Norte and Sur remain the country's top producer of garlic with a combined 1,315.70 hectares (ha) area of production during the last quarter of 2022, this was sourced from the very last harvest of 2022 which was in early November. In 2021, total production of garlic nationwide reached 5,890.14 MT harvested from 2,424.51 ha production area. Total demand was recorded at 139,509 MT, while annual per capita consumption is pinned at 1.26 kilogram. The country's garlic output last year declined by two percent to 5,765 MT from 5,884 MT in 2022, according to the Philippine Statistics Authority. About two-thirds of the annual garlic production in the Philippines comes from the Ilocos region, making it the country's top producer of garlic (Sevillano, 2025).

LOOK: UP Fine Arts student finds thesis opportunity on garlic peels waste Abundance

According to a news article of ABS-CBN, a graduating Fine Arts student from the University of the Philippines-Cebu, took advantage of the peels' waste abundance at Carbon Market, Cebu City. Clent Yanola, taking Bachelor of Fine Arts in Product Design, is the man behind the thesis project that went viral on TikTok who is also aiming for sustainability in the product development of the study. In the process of studying its garlic characteristics, The researcher found that garlic peels can be transformed into tile-based, pulp, ropes, bioplastics, paper, and leather-like material. The researcher also admitted multiple trial and error processes before it completely conceptualized the study. The student's TikTok video featuring the thesis rapidly went viral, reaching wider audiences that is continuously showered with positive feedback from the netizens. The reason why the researcher uploaded that video is that in order to inspire other students, to show something new, and to persevere with the other students' thesis to take it seriously. The researcher chose a topic on material exploration, material development and also focused on exploring the immediate environment, looking for problems and trying to provide best solutions (ABS-CBN News, 2024).

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ORION to Perk Up Onion Industry

According to a news article from the Philippine Star, to support onion farmers and increase domestic supply, the Department of Agriculture (DA) will launch the Optimization and Resiliency in the Onion Industry Network or ORION program. It seeks to promote a competitive, resilient and profitable onion industry providing high quality, safe, affordable and sustainable onion supply to meet increasing domestic demand. It will improve productivity and efficiency of onion plantations, reduce pre- and post-harvest losses, intensify product distribution and logistics and ensure sustainable supply in the local market. Under ORION, innovative farming technologies will be pushed as well as value-adding processes to maximize production and income. The national onion harvest reached 264,323.89 metric tons in (Philippine Statistics Authority, 2024), a 4.48 percent increase from 2023 (Rivera, 2023).

Here are some studies in the Philippines discussing about the the waste management:

Waste Management Practices for Food and Agricultural By-Products: Case Studies of Public Markets in Zamboanga City

According to a study from Zamboanga City, there are challenges in handling food and agricultural by-products because of insufficient infrastructure, limited sources, and low awareness among people, specifically business owners. The environmental damage as well as public health risks are affected by improper disposal of organic waste and lack of effective waste management. This study highlights the need to implement a comprehensive waste management framework that includes informing everyone about waste segregation practices, enhancing awareness and education programs, and improving services on waste collection (Tendero, 2023).

Study on Circular Economy Pathways for Waste Management in the Philippines

According to a study from Philippine Institute for Development Studies, as the Philippines strives to handle waste management for more than two decades with the strong implementation of the Republic Act No. 9003, the Ecological Solid Waste Management Act of 2000, is a positive step towards issues surrounding the waste management and achieving a circular economy (CE). The study discussed that recycling and recovery are most often recommended under circular economy. High income and developed countries lean more towards technological solutions which low income and developing countries cannot afford. Recovery programs include already existing mechanisms such as waste recovery schemes, diversion, transportation, clean up, and local and community partnerships (Bueta et al., 2023).

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A Long-Standing Problem: A Review on the Solid Waste Management in the Philippines

According to a study from Aurora State College of Technology, solid waste management is seen as a critical worldwide issue that requires the government and its citizens to act immediately. Waste is a natural part of the human life cycle and waste in the Philippines is steadily increasing and is predicted to do so even more in the years to come. According to the analysis, the nation's growing solid waste volume, lack enforcement of the law, lack of hygienic landfills, and inappropriate disposal are all related issues with solid waste management. The Ecological Solid trash Management Act of 2000, also known as RA 9003, is the nation's best option and emphasizes the importance of trash reduction, appropriate disposal, and segregation. The law and its implementation will be a great help to address the issues and problems on solid waste management in the country. Also, converting waste materials into more useful products including chemicals, materials, and fuels can potentially solve the problems (Coracero et. al., 2021).

Here are some studies in the Philippines discussing about the garlic and onion as paper:

Eco-Friendly Paper Out of Garlic Skin (*Allium Sativum*)

According to a study from Ilocos Sur, Lussoc National High School, paper is already part of all humans, especially to students. Paper is a medium used to write on for projects, for hard-copy paper, for works and many more. In creating books, paper is the material used for the pages. Paper bags and boxes which are used for packaging. With the fact that paper plays a role in the survival of humans, trees are continuously cut down since traditional papers are made from pulp of wood. The researcher's purpose was to prove that Garlic Skin Paper is good at recycling waste materials that are already considered as garbage or trash, and to lessen the tree cutting problem. The overall purpose of the study is to convince the audience on how garlic skin becomes an organic paper and find a way that can help the environment especially in waste management (Tadeja, 2020).

Utilizing Onion (*Allium Cepa* L.) Peels into Organic Straw

According to a study from Novaliches High School, one of the most cultivated crops in the world is onion (*Allium cepa*). Some factors like dry skin or damaged onions were thrown away, which affects the environment in various ways like problems in waste management. Onion production has increased by at least 25% over the previous 20 years, it now accounts for roughly 47 million tons annually, making it the second-most significant horticultural crop (NCBI.NLM.NIH.GOV, 2021). Furthermore, the Philippines has policies and repeated campaigns to reduce, reuse, and recycle. Filipinos seem to be slow in accepting a recycling culture at home.

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In correlation to that, with 9.56 thousand metric tons produced, the Ilocos Region contributed 90.4% of the quarter's total onion production. Central Luzon came in second with a 9.5 percent share, relating with the production number of onions in the Philippines; high numbers in onion consumption also indicate high onion peels waste (PSA.GOV.PH, 2022). The researchers innovate the onion skin into something useful which will be converted into an "Organic straw product". To conclude, recycling is a commercially effective and attractive waste treatment practice. It can generate income and livelihood for communities and formal and informal waste collectors alike (Tolentino et.al., 2023).

2.2.2 Foreign Literature and Studies

Here are the articles, and journals in some foreign countries discussing about the waste management:

A Conceptual Analysis on the Innovative Utilization of Edible Leftovers: Bridging Food Waste Reduction and Food Security

According to the International Journal of Research and Innovation in Social Science from Malaysia, the innovative utilization of edible leftovers is a solution to the global issue of food waste and its intersection with food security. Food waste, particularly edible leftovers, presents a paradox where nutritious food is discarded while millions face food insecurity. It emphasizes the environmental impact of decomposing food in landfills, which releases methane, a potent greenhouse gas. There are various strategies for repurposing edible leftovers, such as converting these into value-added products and redistributing through food sharing platforms. Global studies indicate that over 931 million tonnes of food are wasted each year, with 11% of this loss occurring at the household level. The vast quantity of edible food that is ultimately wasted highlights the pressing necessity to devise creative ways for minimising food waste and optimising the use of edible remnants, which could be pivotal in tackling food security issues. Despite the potential benefits, barriers such as societal attitudes and logistical issues hinder widespread adoption. The paper underscores the need for innovative solutions and policy interventions to fully leverage edible leftovers in addressing food insecurity and reducing waste. (Arsat et.al., 2025).

Here are the articles, and journals in some foreign countries discussing about garlic and onion as paper:

Turning Food Waste into Paper

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According to an article from Drupa Media News in Germany, there is a solution to food waste problems, and it is called the PaperWise. This is to use the agricultural wastes or remains to produce high quality paper that can be recycled up to seven times to benefit mankind with responsibility due to the agricultural production sector, which uses huge amounts of resources to feed 7.4 billion people worldwide. The wise innovator, Peter van Rosmalen sought to inquire about the reduction of deforestation with the vision of having school children with the mindsets of knowing that paper comes from agricultural wastes such as leaves and stems. For the insurance of the quality of the product or unintended consequences, PaperWise has been studied by the IVAM University of Amsterdam, it assess the impact of PaperWise products in a Life-Cycle-Analysis (LCA)-Quickscan study, overviewing at the impact of natural resources, chemicals, water, energy, machinery, and waste on the environment throughout the whole lifecycle of the product, finding the results with the indication of having reached sustainability that we're 47% better than wood-based paper and 29% better than recycled paper (Drupa Print Media Messe, 2024).

An Overview on Non-Wood Fiber Characteristics for Paper Production: Sustainable Management Approach

According to a journal from India, the sustainable management approach like using non-wood sources like garlic for the creation of paper, agricultural waste products have become an alternative for raw materials for essential alternative sources of supply as a result of an increase in the production industry, lack of trees, and growing awareness of sustainability. It also includes the benefits such as superior quality of the sources for specialty papers, and the production of paper that has been more ecologically friendly. Furthermore, the financial advantages for the non-wood alternative places the paper manufacturers in the position of a long-term prosperity and environmental responsibility. By investing in non-wood fibers to satisfy rising customer demand for environmentally friendly goods, paper manufacturers may position every individual for long-term prosperity and environmental responsibility (Pydimalla et. al, 2023).

Onion Peel: Turning a Food Waste into a Resource

According to an article from the National Library of Medicine in the United States of America, food waste is a significant issue in the food processing industry. The growing demand for food with improved nutritional value and sustainability due to by-products has led to an interest in selecting improved agronomic species and local varieties. With remarkable bioactivity, phytochemicals present in these onion skin extracts can be further investigated for numerous other

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uses, ranging from sustainable “green” management of agricultural pests to formulation of smart packaging, or formulation of functional food ingredients. Therefore, the multiple re-use of onion waste by-products can be the driving force for the development of sustainable, cost-effective, and efficient technologies for reduction of agricultural and food waste. Hence, our findings can be considered a starting contribution to optimize the sustainable use of this natural resource and make the onion production chain more efficient and sustainable (Celano et. al., 2021).

Here are the studies in some foreign countries discussing about the waste management:

Waste Management – Everything you need to know about Waste Management

According to an article from the Recycling Center at Bristol, England, waste management includes collection, transportation, disposal or recycling and monitoring of waste materials produced as a result of human activity. Waste management encompasses all types of waste, such as household, industrial and hazardous. Waste can also be solid, liquid or gas, each of which has its own methods of management and disposal. The whole purpose of waste management is to reduce the amount of waste that goes into landfill. The most common types of waste management methods and solutions include recycling, incineration and landfill. Recycling enables waste products to be converted and reprocessed into new products. Not only does recycling save on natural resources, but it also reduces energy consumption like the cost of producing new materials and the amount of greenhouse gases released. The incineration, also known as combustion and thermal treatment, incineration is a waste management method that involves burning solid waste at considerably high temperatures to convert the products into heat, gas and steam. On the other hand, landfill sites are essentially large holes in the ground designed to be filled with waste. Put simply, waste management enables every individual to look after the cleanliness of the world. The way in which waste is managed can have a significant impact on the environment and the entire population’s health, so it is vital that measures are in place to effectively manage and dispose of these waste materials. Furthermore, failure to implement appropriate waste management techniques can lead to environmental concerns and health issues. (ETM Recycling, 2020).

The Development of a Zero Waste and Sustainable Waste Management Behavior Scale in Türkiye

According to a study from Turkey, the Zero Waste (ZW) and Sustainable Waste Management (SWM) are based on environmental factors, economic and technical developments, and social and cultural norms. The average weight of waste yearly ranges around 435 kilograms. It

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increases the waste yearly due to population also increases, it causes the decreasing of limited resources. In Nigeria, operational, socioeconomic, natural, and physical barriers affect sustainable waste management. Research on household recycling behaviors, attitudes towards recycling, and segregation of solid waste has been conducted. Sociodemographic characteristics, such as age, gender, education, income, and housing location, also play a role. This study recognizes the importance of the social dimension in Sustainable Waste Management (SWM), it addresses the need for effective waste management practices to achieve environmental goals like recycling. The research involved developing a scale to evaluate behaviors related to zero waste initiatives, aiming to enhance public participation and awareness in sustainable waste management. The findings are expected to inform policies and strategies for improving waste management practices and promoting environmental sustainability (Ikizoglu, 2024).

Here are the studies in some foreign countries discussing about the garlic, and onion peels as paper:

Feasibility Study of Paper Manufacturing from Organic Waste

According to the study from India, the demand for paper in cities has serious effects on ecosystems, especially due to cutting of trees. Due to fast growth in population, urbanization and industrialization, the demand and consumption of paper has increased tremendously. These put a high load on our natural resources and force the industry to look for alternative raw materials. The alternative solution for this is to make paper from materials which are waste for society and which will ultimately reduce the load on waste management. This study investigates the potential of utilizing organic waste materials, such as coir fibers, rice straw, and decomposable matter, as alternative raw materials for pulp and paper production. The research seeks to contribute to the development of eco-friendly and cost-effective alternatives to conventional pulp and paper production methods. Overall, the study aims to utilize waste management by incorporating handmade paper from kitchen waste, to avoid cutting trees to produce paper and also to reduce the load on waste management (Kadam, 2024).

Handmade Paper Formation from Onion Peels

According to a study from India, regardless of having advanced technologies, the demand for paper still remains high. With that, the production of papers severely affects the environment, specifically caused by deforestation, which contributes to climate change, loss of natural environment, and greenhouse gas emissions. Many trees are cut down for making papers, and are

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used for writing, printing, packaging, etc., continuing to harm our environment. This problem caused the need for alternative materials for paper production. Many studies have tried finding and successfully found an alternative material for paper production. Onion skin is one of the alternatives used, as onions are commonly produced and consumed. Its skins are often discarded, which adds up to waste if not properly managed. This waste might cause pollution and destroy the environment. However, several studies indicated that onion skins can be a good sustainable alternative material, since it allows people to not rely on wood-based paper and lessen the environmental impact of the traditional paper production. Using onion skins for making papers not only focuses on waste management but also gives an eco-friendly solution to deforestation (Rajas et. al., 2023).

Valorization of Onion Peel Waste: From Trash to Treasure

According to a study from India, globally fruits and vegetables are consumed as raw, processed, or as an additive, accounting for approximately 50% of total food wastage. Among the fruits and vegetables, onion is well known for its potential bioactive components; however, peels of onion are a major concern for the environmental health and food industries. Effective utilization methods for valorizing the onion peel should be needed to develop value-added products, which are more eco-friendly, cost-effective, and sustainable. Among all fruits and vegetables, onion (*Allium cepa*), owing to its nutritional and medicinal value is routinely used as a primary ingredient in cooking and is a commonly cultivated vegetable throughout the world. The study states that vegetables and onions are the primary ingredient in cooking that is why food waste increases. Onion peels constitute 20 times more flavonoids than flesh; however, during the processing of onion and food formulation, the peel is removed as waste. The onion peel due to its strong aroma cannot be utilized as fodder, not as fertilizers due to the rapid development of phytopathogenic agents, and the disposal in landfills or by incineration is cost-consuming as well as harmful to the environment. In addition, the study also discussed that instead of throwing away the onion peel waste, every individual should use it to combat waste management problems. (Bains et al., 2022).

Onion Peel Waste has the Potential to be Converted into a Useful Agricultural Product to Improve Vegetable Crop Growth

According to a study from China, onion peels can be turned into a thing called Onion Juice Concentrate or OJC, which is a product that helps in improving plant growth. Just like onion peels, garlic peels are also waste that may help and can be turned into a beneficial product. Garlic peels can possibly be used to make eco-friendly products, just as onion peels are used to create OJC for

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plant growth. Instead of just throwing away useful sustainable materials, people came up with the idea of using both onion and garlic peels for creating valuable products that may benefit agriculture and the environment. In the case of onion and garlic peels as paper, this lessens waste and makes a use for what would be only discarded, just like how OJC is made out of onion waste to help the growth of a plant (Zhang et. al., 2024).

2.3 *Research Questions*

This study aims to address waste management problems and present an action product among the Vendors of Garlic and Onion at Commonwealth Market (Bagsakan). Specifically, this study sought to answer this following questions:

Research Question 1: What do the participants usually use with garlic peel and onion skin after consuming it?

Research Question 2: How is the garlic and onion paper different from commercialized paper in terms of:

2.1. Texture

2.2. Color

2.3. Cost

Research Question 3: Will the participants consider using garlic and onion paper as an alternative to wood-base paper? Why?

Research Question 4: How does the use of garlic and onion peels as paper helps with waste management problems?

3.0 Research Method

3.1 Research Design

The researchers will utilize Descriptive Phenomenological Research Design that focuses on analyzing the experiences of the participants through interviews and examining the views. Descriptive Phenomenological Research Design is a qualitative research approach that seeks to understand and describe the universal essence of a phenomenon, it studies lived experiences to gain deeper insights into how people understand those experiences. This research design allows researchers to get more understanding of how Garlon Paper can potentially solve waste

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management problems such as segregation of waste specifically recyclables, land pollution, and waste buildup which can be useful for future research and practices for waste management. The participants will be selected in this study based on the experiences and views of the participants regarding the waste management problems and a product solution of Garlon Paper which allows the participants to establish on how it can be beneficial for someone to experience this phenomenon. Using this research design, it assumes that people use a universal structure or essence to make sense of the participants' experience. This can broaden the participants' knowledge and have an awareness about a certain phenomenon.

3.2 Research Locale

The researchers will conduct this study by selecting participants from the Commonwealth Market (Bagsakan) at Quezon City. The Vendors of Garlic and Onion at Commonwealth Market (Bagsakan) will be made aware of the waste management problem such as segregation of waste specifically recyclables, land pollution, and waste buildup, and a potential solution which is the Garlon (Garlic and Onion Peels) Paper. Here is the main reason why the researchers chose Commonwealth Market (Bagsakan) for conducting this study: The Commonwealth Market is one of Quezon City's busiest public markets and many vendors peel and sell onions and garlic, this is an easy access to sources or supplies of the Garlon product since a lot of garlic peels and onion skins is being thrown out every day (DA-AFID, 2025). The Commonwealth Market specifically in Bagsakan is the place where vegetables such as garlic and onion peels have been peeled out by the vendors and sell the peeled garlic and onion at lower price. This is an ideal location for conducting this study of repurposing the garlic and onion waste into Garlon Paper. The researchers can easily ask for vendors who are consuming the garlic and onion to sell it, and the selected participants may provide a lot of an understanding in awareness and practices related to waste management. The researchers once went to the Commonwealth Market (Bagsakan) to gather garlic and onion peels which engaging the vendors can give insights regarding the waste management problems that the participants faced. This research locale also gives the researchers the opportunity to introduce the Garlon Paper which is made from garlic and onion peels, cornstarch and essential oil (fabric conditioner) as a sustainable solution and eco-friendly alternative paper which can improve the quality and depth of the research outcome.

3.3 Population and Sampling

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The researchers will conduct face-to-face interviews using Judgmental or Purposive Sampling to select five (5) participants. Individuals will be chosen based on specific criteria: Garlic and Onion Vendors who are involved in the peeling and disposal of these products and who possess knowledge regarding waste management issues in the market. The participants will be selected from the Commonwealth Market (Bagsakan), where Garlic and Onion Vendors actively sell, peel, and discard the garlic and onion peels. This location was chosen due to its high volume of vegetable trade and the observable waste management concerns in the area. Vendors who are willing to participate in the study will be asked four (4) structured questions related to waste management problems and the potential contribution of Garlon paper to addressing these issues.

3.4 Research Ethics

The researchers will grant paper consents addressed to those involved in this study. The researchers will get approval from the Principal of the Basic Education Department (BED), Subject Teachers of Inquiries, Investigation, and Immersion and Entrepreneurship involved in the study, Junior and Senior High School Academic Coordinators, Discipline Coordinators, and the five (5) participants. The researchers made sure to follow the ethical process of this study. The questions for a face-to-face interview will not cause the participants any risk. The owners of the intellectual properties that were used in the study were acknowledged by citations and were found at the References page. The intellectual properties are protected by laws, including patents, copyright, trademarks, and trade secret laws. Unlike physical properties or land, intellectual property is often intangible because it concerns the creations of the mind. The given data by the participants will be kept by the researchers with utmost respect and confidentiality. The data from participants will be transferred to another document that guarantees that the obtained data remains the same to keep it accurate and precise for the researchers to counter check if mistakes are committed; furthermore, its validity will be put at stake if mistakes are made. To prevent this, the researchers certified that all given data are correct and connected to the questions to give precise information. The findings will be based on the perspective and knowledge of the participants, not on the researchers' opinions. The raw data from the participants will be gathered and used for the research study and will not be manipulated by the researchers. The step-by-step research process such as research consent papers, gathering of data, and interpretation of the data will be examined by a research instructor. This study can be replicated and modified for the future researchers interested in this qualitative research.

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3.5 Research Instruments

In this qualitative research, the researchers will utilize a Structured Interview among the chosen five (5) Vendors of Garlic and Onion at Commonwealth Market (Bagsakan) as the research instrument of collecting data for the study. The Structured Interview is a method that uses a set of consistent questions in a specific order to gather data. To make the responses easier to compare, each and every respondent will be asked the same four (4) research questions prepared by the researchers in order to gather information regarding waste management problems, and to collect insights about the product called Garlon Paper, which is a paper made out of garlic peel and onion peels. During the interviews, the researchers will take notes on the participants' answers. Additionally, the researchers' smartphones will be used to record an audio to accurately document the responses, ensuring that there are no misinterpretations of the information provided. The interview will also be kept confidential and will only be used for this study to protect the privacy of the participants.

ACKNOWLEDGEMENT

The researchers would like to express the deepest gratitude to the following individuals who were part of this study for the invaluable support and assistance to the completion of this research project:

Researchers' Parents and Guardians, who support in financial education, and lend a hand to throughout the personal challenges of each member, and to the entire school year and research process is greatly appreciated by the researchers;

Researchers, who support and help each other to efficiently accomplished the content of manuscript is greatly fulfilling and appreciated;

Ms. Melca Gonzales, LPT, the adviser in the subject of Inquiries, Investigation, and Immersion, who gave guidance, support, help, and understanding throughout the entire research

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process, and especially for sharing the subject adviser's wisdom is greatly appreciated by the researchers;

Mr. Robert Morales, the adviser in the subject of Entrepreneurship, for sharing the subject adviser's knowledge on business and producing a product is greatly appreciated by the researchers;

The authors of the literature, studies, journals, and articles for supplying the references utilized in this study;

Above all, to the **Almighty God**, who continues to guide and provide the researchers with knowledge, strength, and good health as the researchers accomplish this study.

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Glossary	of	Terms
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Agronomic - refers to anything related to agronomy, which is the science and practice of growing and managing crops and soil.

Allium Cepa - is the scientific name for the common onion, a species of which is used in cooking and for its medicinal properties.

Allium Sativum - it is a garlic, a species of bulbous flowering plants and an herb related to onion, leeks, and chives.

Augment - to make something greater by adding to it, typically in size, amount, or degree.

Cardioprotective - refers to any substance, treatment, or lifestyle change that helps protect the heart and cardiovascular system from damage or disease.

Cellulose - a complex carbohydrate and the main structural component of the cell walls in plants

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such as in garlic and onion.

Composting - is the process of breaking down organic materials, such as food scraps, leaves, and yard waste, into a nutrient-rich soil amendment called “compost”.

Denuded - stripped or deprived of something, often referring to something being bare or lacking its usual covering.

Detrimental - It refers to something that is harmful or detrimental to a person, object, situation, or condition.

Flavonoids - are a group of naturally occurring compounds found in plants, known for their antioxidant properties.

Fodder - refers to plant material or byproducts of onion cultivation that can be used as feed for animals.

Halving - refers to the act of dividing something into two equal parts or reducing it by half.

Holistic Approach - refers to viewing or addressing a situation, problem, or system in its entirety rather than focusing on individual parts.

Impoverished - refers to a state of being very poor or lacking in basic necessities, resources, or wealth.

Inadequate - something that is not sufficient or does not meet the required standard or expectations.

Incineration - the process of burning something, typically waste, at high temperatures to destroy it completely.

Land Occupation - refers to the act of settling, using, or inhabiting a piece of land.

Meticulous - refers to someone who shows great attention to detail and is very careful and precise in work or actions.

Nutraceuticals - are food-derived products that provide health benefits, including the prevention and treatment of disease.

Paradox - is a statement or situation that seems contradictory or self-refuting but may, in fact, be true or reveal an underlying truth.

Pharmaceutical - refers to anything related to the production, development, and use of drugs or medications.

Pivotal - refers to something that is of crucial importance in determining the outcome or direction of a situation or event.

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Phytochemicals - are naturally occurring chemical compounds found in plants.

Phytopathogenic - refers to organisms, typically fungi, bacteria, or viruses, that cause diseases in plants.

Plea - typically in response to appeal or claim.

Pulp of Wood - refers to the fibrous material derived from wood that is processed for use in the production of paper, cardboard, and other products.

Resource Depletion - refers to the exhaustion or reduction of natural resources due to overuse, exploitation, or consumption at a rate faster than they can be replenished.

Remnants - refers to small remaining parts or traces of something that once existed or was more abundant.

Valorizing - refers to the act of giving value, importance, or recognition to something.

(About the Researchers)

Group 1

Name	Roles	Task	No. of Articles Contributed
Bolledo, Mary Jaymella Zhyme G.	Facilitator (Principal Investigator)	Introduction, Theoretical/ Conceptual Framework, RRL Local, RRS Local, RRL Foreign, Research Questions #1	9

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		(paraphrased RQ #2-#4, Table of Contents, Acknowledgement, References, Glossary of Terms)	
Ubana, Djamilla Rose R.	Recorder	RRS Foreign, Research Method, Research Design, Research Instruments, Research Question #3)	5
Orjaliza, Nickson Jr. S.	Time Keeper	Introduction, RRS Local, RRL Foreign Research Question #4)	1
Candido, Bryant L.	Material Gatherer	RRL Foreign, RRS Foreign, Research Question #2, References	6
Barotillo, Juan Carlos D.	Proofreader	RRL Foreign, References	1
Bolledo, Mary Jaymella Zhyme G.	Proofreader	Background of the Study, Theoretical/Conceptual Framework, RRL Local, RRS Local, RRL Foreign, Research Question #1 (paraphrased RQ #2-#5, Table of Contents, References)	9
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	Encourager	Research Questions #1 (paraphrased RQ #2-#4, Table of Contents. References RRL Foreign, RRS Local, Glossary of Terms	
Minay, Kriztiane Reign B.			2