



RIZAL TECHNOLOGICAL UNIVERSITY
College of Engineering and Industrial Technology



IMPROVISED INDOOR AIR PURIFIER

A Student-Faculty Collaborative Research
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By:

BABARAN, JHON ANDRY M.
DE SAGUN, VEN ANDREI D.
FABELLA, GRANT F.
ISIDORO, LAWRENCE RAE M.
SANTIAGO, JEROME P.
ENGR. NIÑO AUGUSTO CURPOS (Collaborator)

DR. NOEL D. BINAG
Adviser

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ABSTRACT

The research was done in Pateros due to its air quality condition of $107\mu\text{g}/\text{m}^3$, is said to have an unhealthy air according to study. The thing that causes this unhealthy air quality is the contaminants such as particulate dust particles, formaldehyde, etc. These contaminants may also affect the air quality in indoor places. One of the best ways in reducing the said contaminants is to clean the air using air purifier.

This study is made to produce an improvised indoor air purifier which will cost less compared to the purifier in the market. Testing, determining and comparing the amount of air contaminants that the purifier can filter using three kinds of filter: the activated carbon, fiber and the combination of the two are also considered. Lastly, Identifying which of the three kinds of filter is the most effective in reducing contaminants particularly, PM_{2.5} (Particulate matter 2.5).

For the cost, the study found that the improvised indoor air purifier only cost Php2, 500.00, much lesser that the purifier in the market that ranges from 10,000 – 45,000 pesos. After the test, the data shows that, within one hour, the filter that gives the best results in reducing PM_{2.5} and is considered to be the most effective among the three, is the fiber filter, which



reduced 38.8% of PM2.5, while activated carbon and the combination, only reduced 33.5% and 20.7% respectively, they also filtered small amount of TVOC and Formaldehyde.

The indication of these results for the society and environment are that people don't have to suffer illnesses because of breathing contaminated air and having clean and safe air doesn't have to be expensive. The study about the filter indicates that not all filters can filter same amount of contaminants, choosing a good filter will be a factor to have a good quality air purifier.



CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

People nowadays spend as much as ninety percent of time in indoor environment. Numerous sources of air contaminants have been characterized as indoor pollutant, such as dust, smoke, pollen, total volatile organic compounds (TVOCs) and formaldehyde (HCHO); have given substantial attention in terms of potential bad health effects. Dust, smoke and pollen are characterized as particulate matter (PM). These air contaminants can increase the risk of having respiratory diseases, which is one of the top diseases that can cause death to a lot of people in the world. Total volatile organic compounds (TVOC's) are gaseous organic compounds from photochemical smog which is based on carbon or rings with vapor pressure that participate in atmospheric photochemical reactions. Formaldehyde (HCHO) is the highest form of TVOC that can cause neurotoxic effects when exposed to greater amount. Paternos as the area of research have a level of pollution that was considered as lightly polluted municipality. Lightly polluted areas may cause slight irritations to



individuals and can be harmful to people with breathing or heart problems. The United States Environmental Protection Agency (USEPA) includes indoor air pollution among the top five environmental health risk.

Pateros is located southeast of Manila, the smallest of the seventeen cities and municipalities comprising the Metropolitan Manila. Pateros is composed of ten barangays with a total land area of 210 hectares. The research was done in Pateros due to its air quality condition of $107\mu\text{g}/\text{m}^3$, is said to have an unhealthy air according to study.

As the awareness in alarming increase of potential indoor air contaminants, air filtration system plays significant role in cleaning the air wherein air purifier would be the best option. But it has high market value that many cannot afford to buy. So the researchers come up with the idea of making improvised air purifier to reduce indoor pollution.

In particular, the improvised air purifier filters air contaminants by the use of economical but efficient filters. Multidimensional tests were conducted to identify if the contaminants in the air was eliminated or reduced. Air purifier device aims to help environment especially in the aspect of air pollution.



Theoretical/Conceptual Framework

This framework explains the step by step and systematical study in making improvised indoor type air purifier that can filter a contaminated air. This study aims to have a safe and clean air to breathe and introducing proper ventilation of air. Figure 1, the diagram shows the conceptual framework on how air purifier work.

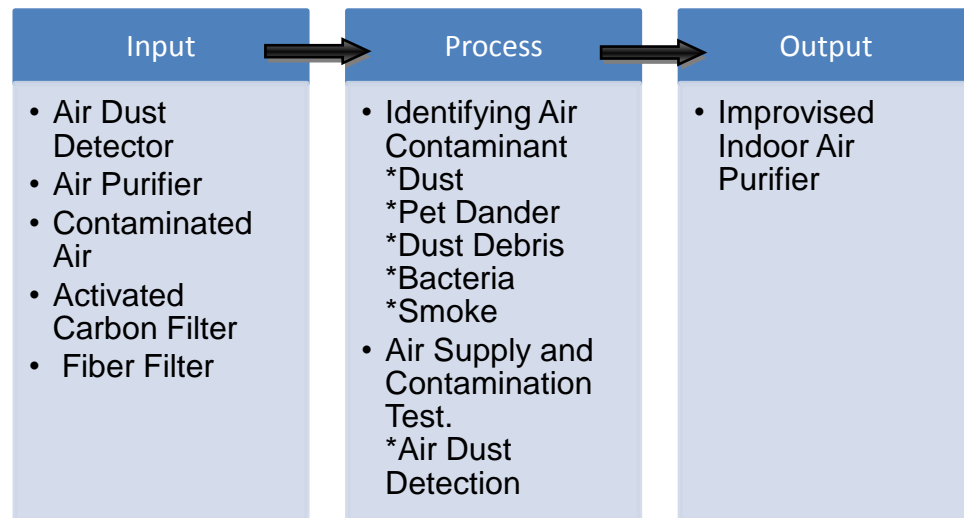


Figure 1. Research Paradigm

Based on figure 1, input contains the different kind of filter materials which are the activated carbon filter and the fiber filter. The air dust detector is a device to be used in testing and, the purifier itself. With