



## FINAL YEAR PROJECT 'SMART CLEANER VACUUM'

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## **CHAPTER 1**

*(Prepared By : Muhammad Fildza Humaidi Bin Mohamad Zulkifli)*

### **1.1 ABSTRAK**

Dalam kehidupan seharian, aspek kebersihan rumah amat dititik beratkan oleh setiap individu dalam kalangan masyarakat. Pada hari ini, sesetengah individu mendapati bahawa sukar bagi mereka untuk memastikan rumah sentiasa dalam keadaan bersih. Hal ini demikian kerana, mereka sangat sibuk dalam melakukan rutin harian sehingga mereka tidak mempunyai masa untuk membersihkan rumah. Selain itu, kebanyakan daripada mereka juga menganggap bahawa kerja-kerja pembersihan mengambil masa yang lama dan penggunaan tenaga yang banyak. Sebagai contoh, selepas selesai menyapu, mereka perlu membuang sampah yang telah dikumpulkan ke dalam tong sampah dimana ia melibatkan banyak kerja. Di samping ia menggunakan peralatan yang banyak, pembuangan sampah juga perlu dilakukan dengan betul agar ia tidak mengotorkan tempat yang dibersihkan. Akan tetapi, perkara ini dapat ditambah baik dengan penggunaa 'Smart Vacuum Cleaner'. Maka itu, dengan tercipta projek ini, kerja pembersihan akan lebih senang dilakukan berbanding sebelum ini.

### **ABSTRACT**

In the daily life, aspects of a clean house is very important to every individual among the community. Nowadays, some of individuals found out that is difficult for them to make sure their house always in clean conditions. This is because, they are too busy doing their daily routine until they did not have time to clean their house. Besides that, most of them also consider that all the cleaning jobs will take a long time and also use a lot of energy to do the task. For example, after they are done sweeping, they need to throw the trash away into to dust bin where they will have many works to do. In addition that it need to use many tools, the trash disposal also need to well done so it won't make the clean place become dirty. But this things can be improved by using ' Smart Vacuum Cleaner'. So with the creation of this project, cleaning job more easier compared to before.

*(Prepared By : Fareez Izwan Bin Jabridin)*

## **1.2 - INTRODUCTION**

- The project will cover lightweight cleaning processes for housewives in the house. The purpose of this project is to ease the burden of housewives while spending up the cleaning work. The project name given is 'smart cleaner vacuum' which realistically uses a vacuum system in a cleaning job is to easier than a cleaning system in a cleaning job is easier than using a cleaning system such as a broom and a shovel.

## **1.3 - PROBLEM STATEMENT**

- i - Some housewife who do more than one jobs at the same time.
- ii - Not all waste can be cleared using a shovel.
- iii - Inefficient cleaning work.

## **1.4 – OBJECTIVES PROJECT**

- i - In save time and energy work.
- ii - Satisfied direct cleaning by using vacuum.
- iii – Short cleaning process

## **1.5 – STUDY QUESTIONS**

- i - Adjusting the project of household project to help it.
- ii - Assignment for the householder can help this project.
- iii – Providing self research schedule on the project.

## **1.6 – PROJECT INQUIRY**

- i – What is the purpose of this project replaced ?
- ii – What is the main user provided with this project?
- iii - What are the costs needed to get a project?
- iv – Does this project help use the problems?
- v – How does this project give good to a patient in a right quality?
- vii – What application is in use in the project?

## **1.7 SCOPE PROJECT**

- i – For home letters
- ii – For housewives

## **1.8 PROJECT INTEREST**

- i – Promote hygiene practices
- ii – Lighten the burden on families returning home from work
- iii – Avoid any impurities and diseases

## 1.9 GANTT CHART

PROJECT ACTIVITIES	Week														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Make a group and discuss the project	Plan	■													
	Actual	■													
Create a little and named the product	Plan		■												
	Actual		■												
Identify the problem statement and objectivess	Plan		■												
	Actual			■											
Designing the product	Plan			■											
	Actual					■									
Discussion the proposal	Plan					■									
	Actual							■							
Discussion for stimulation and calculation	Plan								■						
	Actual									■					
Do report and proposal submit proposal	Plan									■					
	Actual										■				
Presentation and submit report	Plan											■			
	Actual												■		
Test run	Plan													■	
	Actual														■

PLAN
ACTUAL

*(Prepared by: Syed Amirul Hakimi Bin Syed Mohd Fuat)*

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

A vacuum cleaner, also known simply as a vacuum, is a device that causes suction in order to remove debris from floors, upholstery, draperies and other surfaces. It is generally electrically driven.

The dirt is collected by either a dustbag or a cyclone for later disposal. Vacuum cleaners, which are used in homes as well as in industry, exist in a variety of sizes and models—small battery-powered hand-held devices, wheeled canister models for home use, domestic central vacuum cleaners, huge stationary industrial appliances that can handle several hundred litres of dust before being emptied, and self-propelled vacuum trucks for recovery of large spills or removal of contaminated soil. Specialized shop vacuums can be used to suck up both dust and liquids. – Article from Wikipedia

#### **2.2 NAME**

Although vacuum cleaner and the short form vacuum are neutral names, in some countries (UK, Ireland) hoover is used instead as a genericized trademark, and as a verb. The name comes from the Hoover Company, one of the first and more influential companies in the development of the device. The device is also sometimes called a sweeper although the same term also refers to a carpet sweeper, a similar invention. – "Fascinating facts about the invention of vacuum cleaner by Daniel Hess in 1860"

## **2.3 HISTORY**

In 1860 a manual vacuum cleaner was invented by Daniel Hess of West Union, Iowa. Called a 'carpet sweeper', It gathered dust with a rotating brush and had a bellows for generating suction. Another early model (1869) was the "Whirlwind", invented in Chicago in 1868 by Ives W. McGaffey. The bulky device worked with a belt driven fan cranked by hand that made it awkward to operate, although it was commercially marketed with mixed success. A similar model was constructed by Melville R. Bissell of Grand Rapids, Michigan in 1876, who also manufactured carpet sweepers. The company later added portable vacuum cleaners to its line of cleaning tools. – Hess, Daniel (10 July 1860) "Carpet-Sweeper" U.S. Patent 29,077

*(Prepared By : Muhammad Fildza Humaidi)*

## **2.4 TYPE OF VACUUM CLEANER**

### **Upright Vacuum**

**What they are:** With powerful suction, a tilt-and-push design, and bagged or bagless options abound, these traditional floor cleaners do back-and-forth floor cleaning with ease.

**What they're best for:** They're standouts for deep-cleaning carpeting. Look for a brush roll that can be turned off for cleaning bare floors, and/or height-adjusted if you have rugs of various pile thicknesses. New cordless models promise full-power unencumbered cleaning, but their batteries may not last long enough for a marathon session.

**Limitations:** Uprights aren't as versatile as canister vacs since they generally have fewer attachments, and may be heavier to push and pull than a canister's nozzle. While edge-to-edge suction is generally good, you may still need an attachment to get into tight corners

### **Dyson DC07 Vacuum Cleaner**



**Manufacturer :** Dyson Digital Motor

**Date of manufacture :** 2001-2008

## Canister Vacuum

**What they are:** Comprised of a tank with a long hose, these powerful suckers come with a bevy of attachments.

**What they're best for:** Cleaning and dusting just about anything. The motorized brushroll head can clear carpets of debris, while the bare-floor attachment tackles just that. With the other attachments you can spiff up furniture, curtains, walls, and ceiling corners with ease. Their compact bodies and long hoses make them especially well-suited for cleaning stairs.

**Limitations:** Dragging the canister around behind you may be a nuisance if you have large rooms, and lugging it up and down stairs usually requires two hands. They can also be bulky to store.

### Miele Compact C2 Electro+



Manufacturer : Miele & Cie. KG

Date of manufacture : 2010



## Robotic Vacuum

**What they are:** These cool cordless machines "map" your room and zip around to sweep (and in some cases wet clean your floor) with no effort by you. They can even be controlled by remote or programmed to clean when you aren't home.

**What they're best for:** In-between housecleaning touch-ups are the robot vac's forte. They get under furniture that other vacuums struggle to access and into the areas you may overlook.

**Limitations:** Their cleaning power can't compare to that of a full-size machine. You have to pick up the room before setting the vac loose — if you have a lot of obstacles, it may not do the best job. Plus, most models are pricey.

Ecovacs Deebot N79S



Manufacturer : Ecovacs Robotic

Date of manufacture : 2018

*(Prepared By : Muhammad Fildza Humaidi)*

## **2.5 MATERIAL SELECTION**

### **2.5.1 VACUUM**

A vacuum is a component of certain types of people use daily. The meaning of vacuum is space devoid of matter. The word stems from the Latin adjectives *vacuus* for 'vacant' or 'void'. An approximation to such vacuum is a region with a gaseous pressure much less than atmospheric pressure. Other things equal, lower gas pressure means high-quality vacuum.

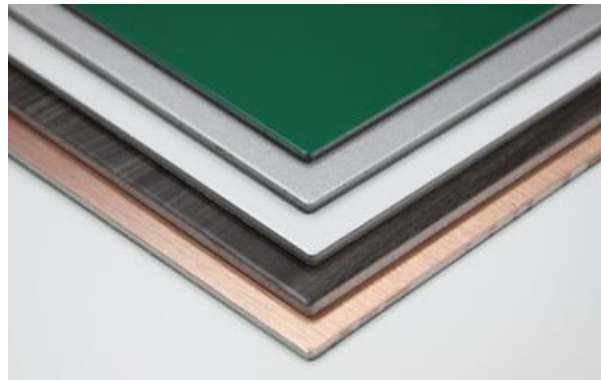
How does a vacuum work? Vacuum cleaner uses an electric motor that spins a fan and any small particles caught up in it and pushing it out the other side, into a bag or a canister to create the negative pressure.

Who created a vacuum? It was Hubert Cecil Booth (1871 - 1955) was a British engineer who and inventor of the first powered vacuum cleaner among other things, H.C. Booth was born in Gloucester, England on July 4th, 1871. His father was a lumber merchant Abraham Booth, and he had five brothers. He went to Gloucester College and Gloucester County School and learned under headmaster of the school Reverend H. Lloyd Brereton. Booth is known for introducing one of the first powered vacuum cleaners, Booth initially did not attempt to sell his machine, but rather sold cleaning services. The vans of the British Vacuum Cleaner Company (BVCC) were bright red; uniformed operators would haul hose off the van and route it through the windows of a building to reach all the rooms inside. Booth was harassed by complaints about the noise of his vacuum machines and was even fined for frightening horses. When cleaning the Royal Mint, upon leaving he was arrested as his machine had collected a massive amount of silver dust from the coins and he had forgotten to empty it, Booth received his first patents on 18 February and 30 August 1901. Booth founded Goblin, his company to sell vacuum cleaning services and refined his invention over the next several decades.



### **2.5.2 COMPOSITE PANEL**

Composite panels were manufactured using a hand lay-up compression molding process. To process the composite panels, nine layers of flax fiber fabric were placed on the mold, and resin was poured onto the fiber until the fiber was soaked with resin. A nonporous polytetrafluoroethylene (PTFE) sheet was placed on top and bottom of the fiber, and a caul plate with dimensions of 250 mm×200 mm was placed on top. The entire lay-up was sealed under a layer of vacuum bagging plastic, a second steel plate was placed on top of the lay-up, and the mold was placed in a top bench manual heated press, Carver Model 3856



### **2.5.3 ROLLER WHEEL**

A roller wheel is used for move something more quickly without used more energy and it can be easy to do our daily work. We prefer to use roller caan make our project easy to move and can increase friction force between our projet and the floor.



*(Prepared by: SYED AMIRUL HAKIMI)*

## **3.0 CHAPTER 3**

### **3.1 METHODOLOGY**

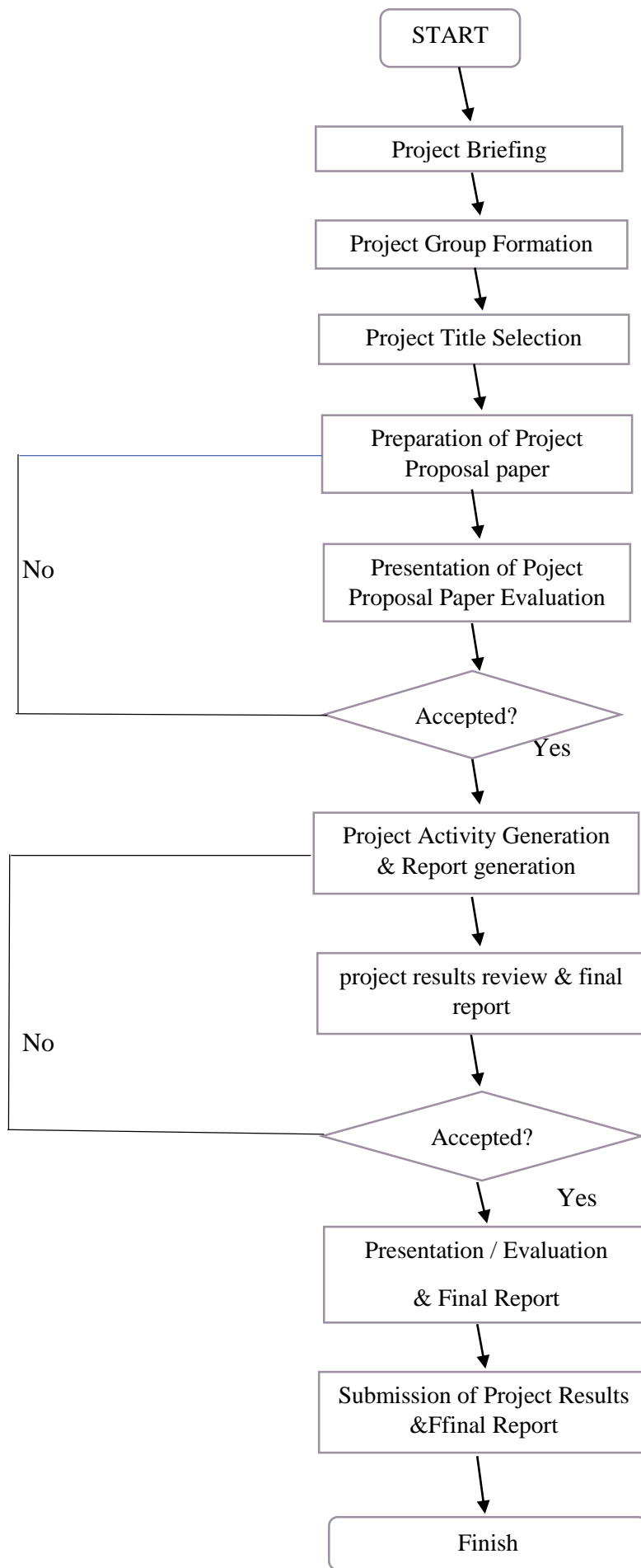
#### **INTRODUCTION**

Methodology is a general research strategy that outlines the way in which research works and, among other things, identify the methods to be used in it. These methods, described in the methodology, determine the way or means of data collection sometimes, how certain decisions are calculate. The methodology does not specify particular method, although much attention is given to the nature and nature of the process to be followed in a particular procedure or to achieve the goal.

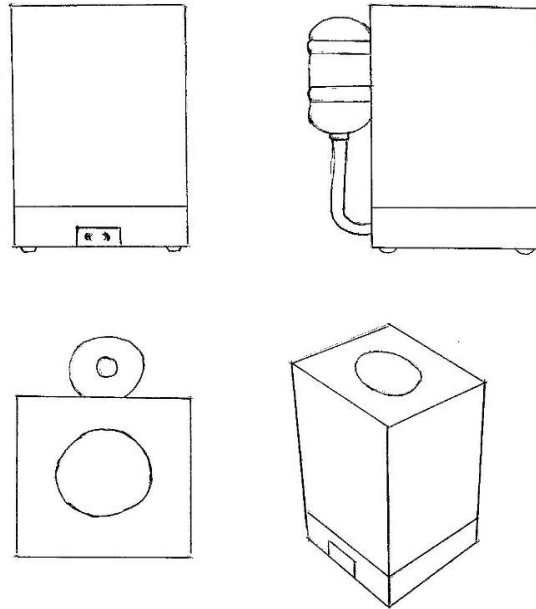
Any description of how the calculation of certain results is always an planation of a method and has never been a description of the methodology. It is before important to avoid the use of the methodology as a synonym for method or by of methods. Doing it diverts it from the true epistemological meaning and reduces the procedure itself, or set of tools, or instruments that supposed to be the result. Methodology is a design process for conducting research or development or procedures not by itself an instrument, or method, or procedure for doing something.

Methods and methods are irreversible. However in recent years, there has been a tendency to use the methodology as a “a pure substitute for the word method”. Using a methodology as a synonym for method or set of methods leads to confussion and misinterpretation and weakening the proper analysis that should be done in planning research.

### 3.2 PHASE OF METHODOLOGY



### 3.3 PRODUCT DRAWING DESIGN



No.	MATERIAL	QUANTITY	PRICE
1.	Composite Panel	5	RM200
2.	Vacuum	1	RM70
3.	Wheels	4	RM30
4.	Aluminium	16	RM150
TOTAL			RM450

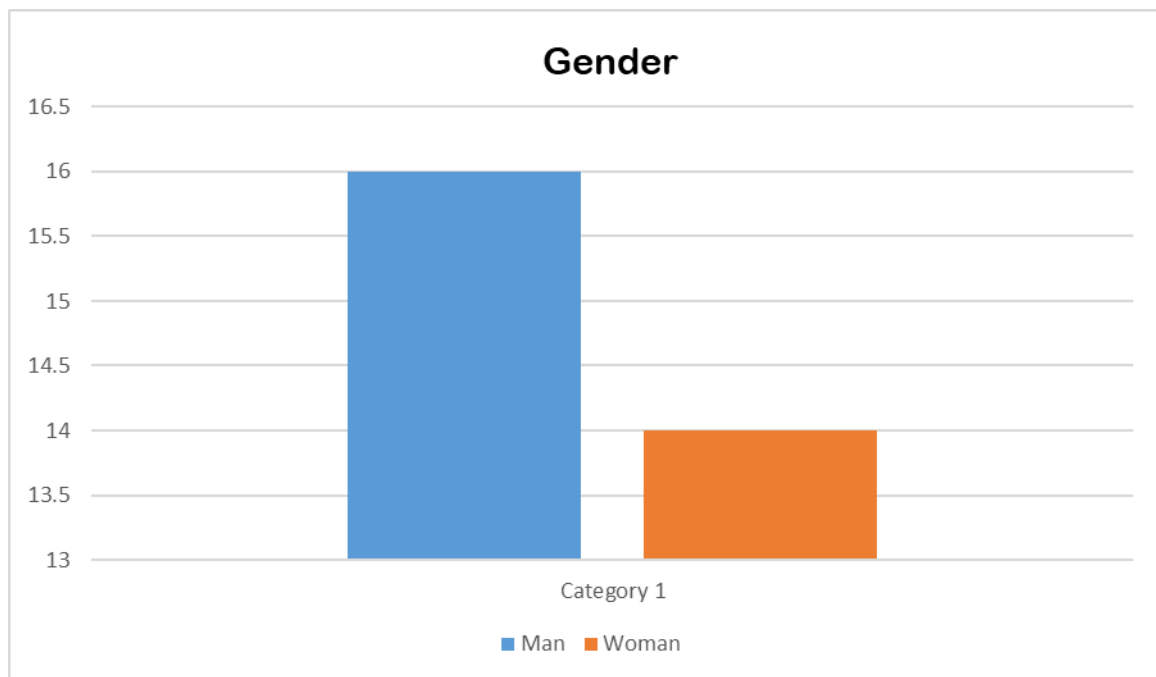
(Prepared By : Muhammad Fildza Humaidi)

## CHAPTER 4

### 4.1 ANALYSIS OF DATA

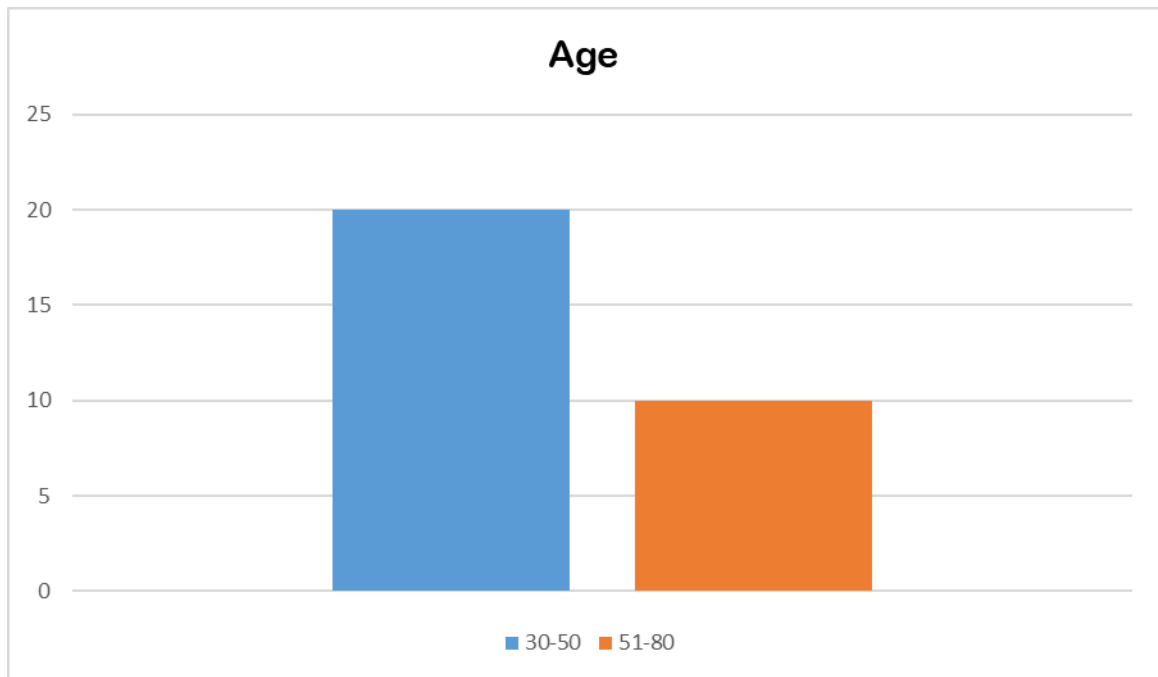
After obtaining all the data and information from research area, data analysis used for see the responses to the effectiveness of Smart Vacuum Cleaner. A total of 30 responses were obtained as result of the survey form that being given to the citizens in the community. The important aspects that be the main purpose in this survey :

- 1) Demographic responses ( Gender , Age & Ability )
- 2) General opinion



\* Graph above shows the number of genders who answered the survey form

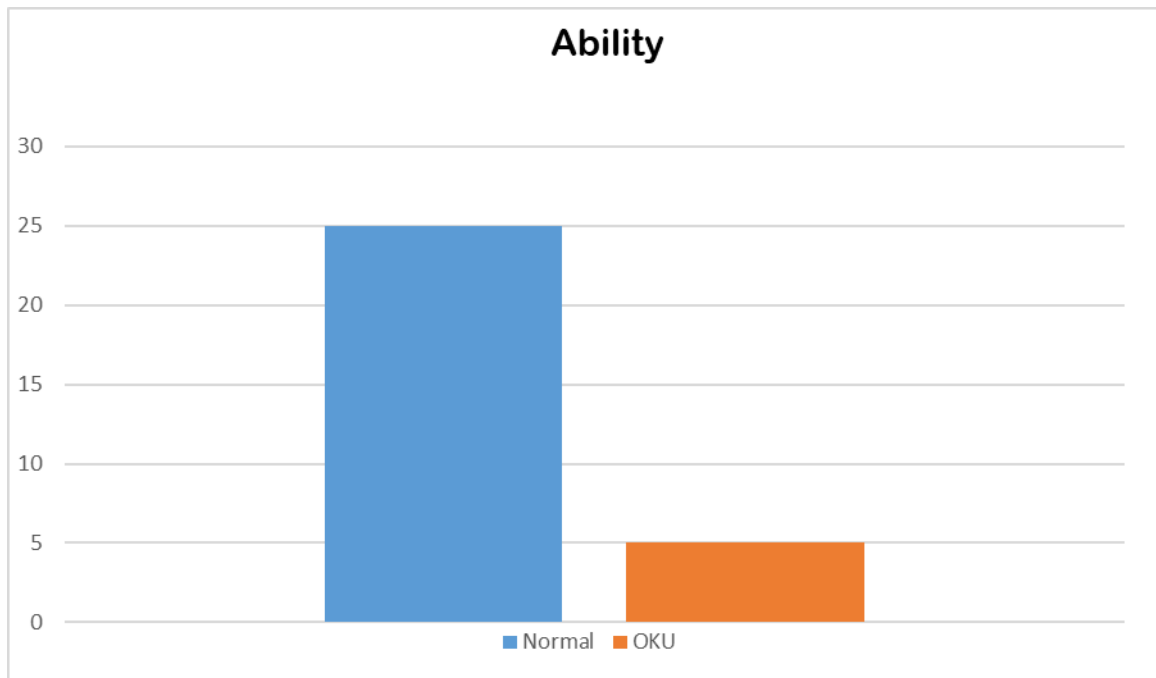
\* A total of 16 respondent who answered the question are man while another 14 respondent are woman



\* The graph above show the age range of the respondents who answered the survey form

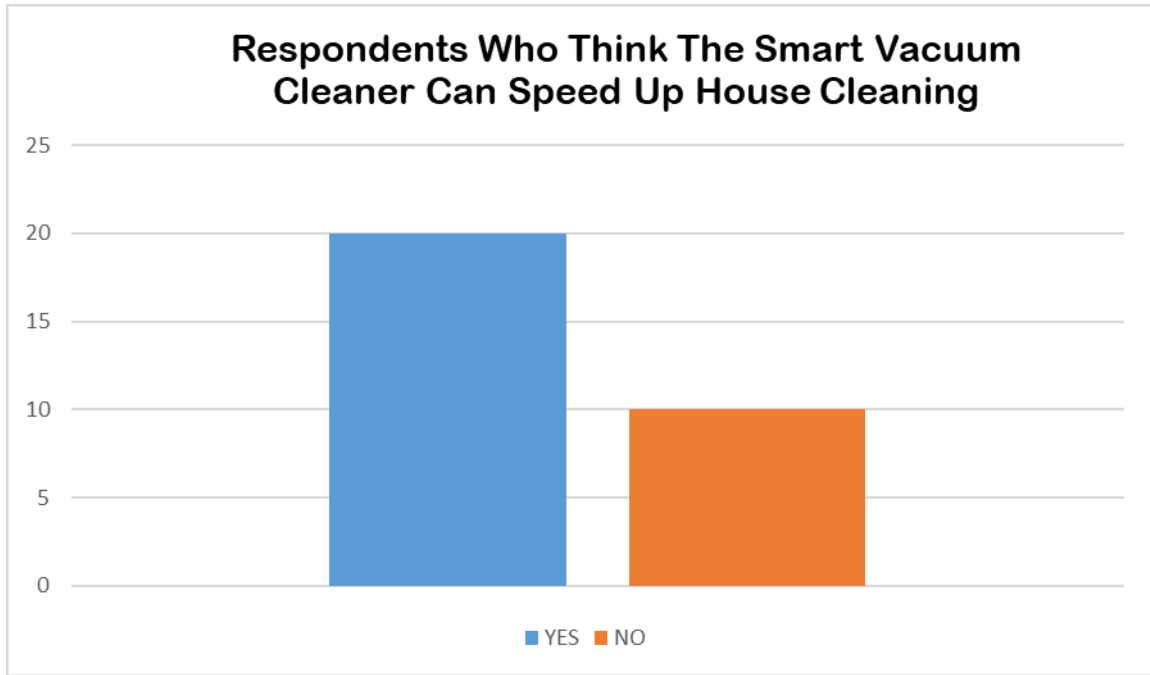
\* Analysis found out that 20 respondent who answered are in age range of 30-50 while another 10 respondent are in age range of 51-80





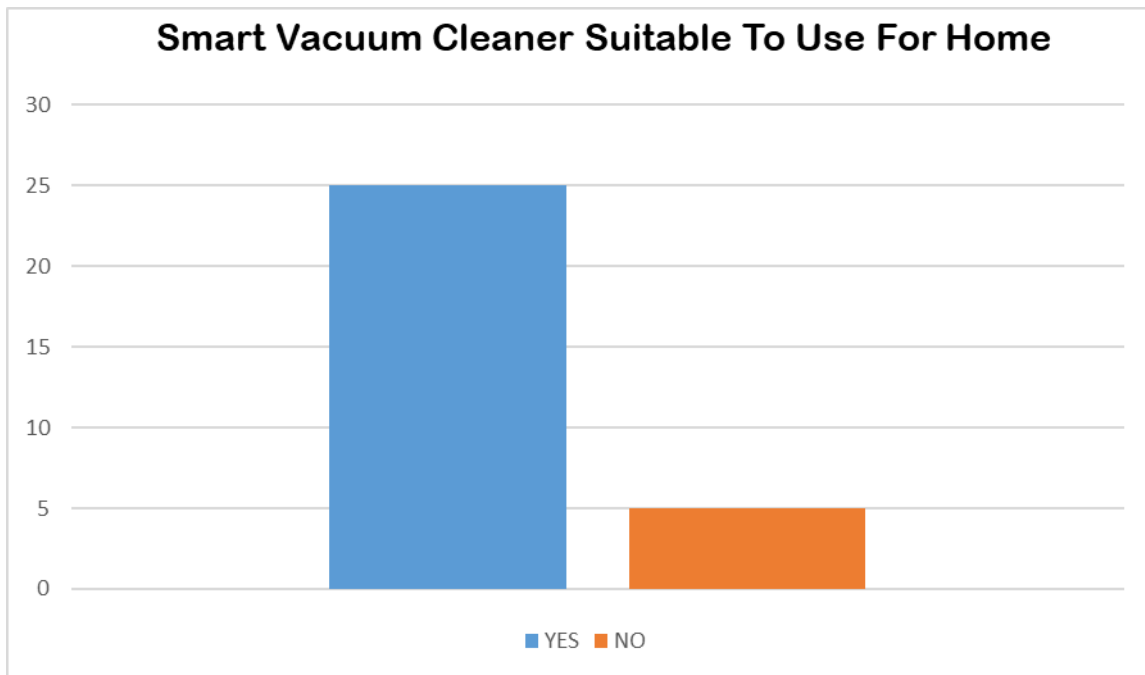
\* The graph shows the ability of the respondent who answer the survey form

\* About 25 respondent are a normal person while another 5 respondent are OKU



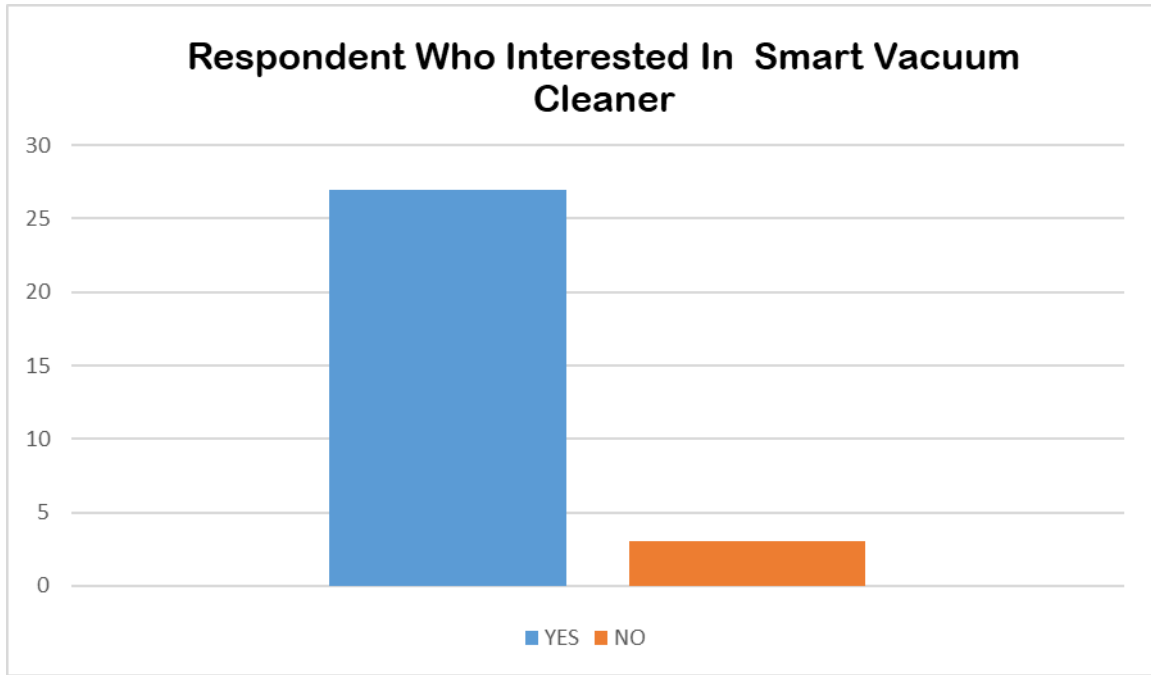
\* The graph show the number of respondent opinions about the ‘Smart Vacuum Cleaner’

\* A number of 20 respondent who answer YES for their opinions while another 10 respondent give answer NO for their opinions



\*The graph show the number of respondent who think it is suitable or not

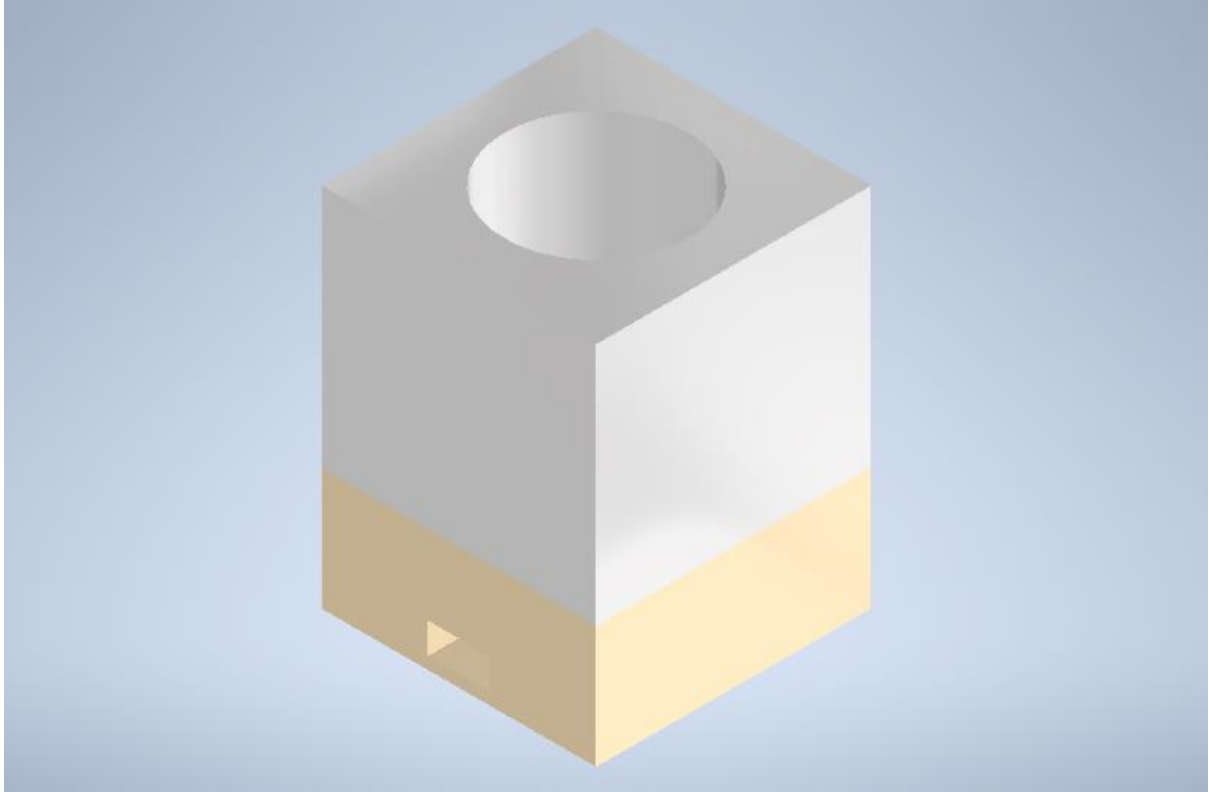
\* Ther are 25 respondent who answer for Yes because they are agree while another 5 respondent are disagree and answer for NO



\*The graph above shows the number of respondents who interested with 'Smart Vacuum Cleaner

\*A total of 27 respondent are interested to buy Smart Vacuum Cleaner while 3 respondent are not interested

## 4.2 SAMPLE OF PRODUCT



### 4.2.1 SIZE AND SHAPE

- This product is on Cube shape with overall size **450x470mm (H)**.
- The Fibre Board has **4 PIECES** with sizing **450 (L) & 470 (H)**.
- The upper Fibre



**DEPARTMENT OF MECHANICAL ENGINEERING  
POLYTECHNIC SULTAN SALAHUDDIN ABDUL AZIZ SHAH**

**SMART CLEANER VACUUM**

*The survey consists of 2 section A and B. Respondent will answer based on the survey research topic.*

PLEASE (/) THE RELEVANT ANSWER

**SECTION A: RESPONDENT DEMOGRAPHIC**

- |               |               |              |
|---------------|---------------|--------------|
| 1. Gender     | 2. Ability    | 3. Age       |
| a) Male ( )   | a) Normal ( ) | a) 30-50 ( ) |
| b) Female ( ) | b) OKU ( )    | b) 50-80 ( ) |

**SECTION B: PRODUCT SURVEY ( SMART CLEANER VACUUM – RM500 )**

PLEASE CIRCLE THE RELEVANT ANSWER

1. Do you think, at your house, the Smart Cleaner Vacuum can speed up your house cleaning activity?

YES	NO
-----	----

2. Do you think by using Smart Cleaner Vacuum can help your housewife easy to work especially senior citizen family?

YES	NO
-----	----

3. Are the Smart Cleaner Vacuum suitable used for daily house cleaning?

YES	NO
-----	----

4. Do you interested in this Smart Cleaner Vacuum?

YES	NO
-----	----

*(Prepared by: Syed Amirul Hakimi Bin Syed Mohd Fuat)*

## **CONCLUSION**

Throughout the completion of this project, it has given us a useful thinking experience to be more creative and innovative. In completing this 'Smart Cleaner Vacuum' projects, it is able to generate students with the results of this project is expected to be a testament to our sincerity and knowledge in producing innovative products in the cleaner activity. Cleaning function is very important in our project and it is our main focus to this project. We also facilitate use by creating a simple and easier products. Based on the objectives, the conclusion of this project are very useful and easy to handle. In conclusion, we can differentiate existing vacuum that make it easy and be a clean individual. This can be concluded that the 'Smart Cleaner Vacuum' project has achieved its objectives. We hope that if this project is approved, we will produce products that will facilitate that daily lives of people in the future.

## **RECOMMENDATION**

Based on the problem statement, below are the recommendation:

- Ensure 'Smart Cleaner Vacuum' does not using large space during cleaning activity.
- Using the lightweight material to make sure "Smart Cleaner Vacuum" are lighter than existing one.
- Use more product to installing the 'Smart Cleaner Vacuum' such as close chairs or kitchen cabinet.

*(Prepared by: Syed Amirul Hakimi Bin Syed Mohd Fuat)*

## **CHAPTER 4**

### **FINDINGS AND ANALYSIS**

#### **4.1 INTRODUCTION**

This chapter combine data and analysis of the Smart Cleaner Vacuum and its materials calculations. This data and analysis are very important for this project to achieve the objectives and scope of the project. This data indicates the successful results of the materials testing. After getting all of this data, we analyze every single possible to make it perfect.

#### **4.2 ADVANTAGE AND DISADVANTAGE**

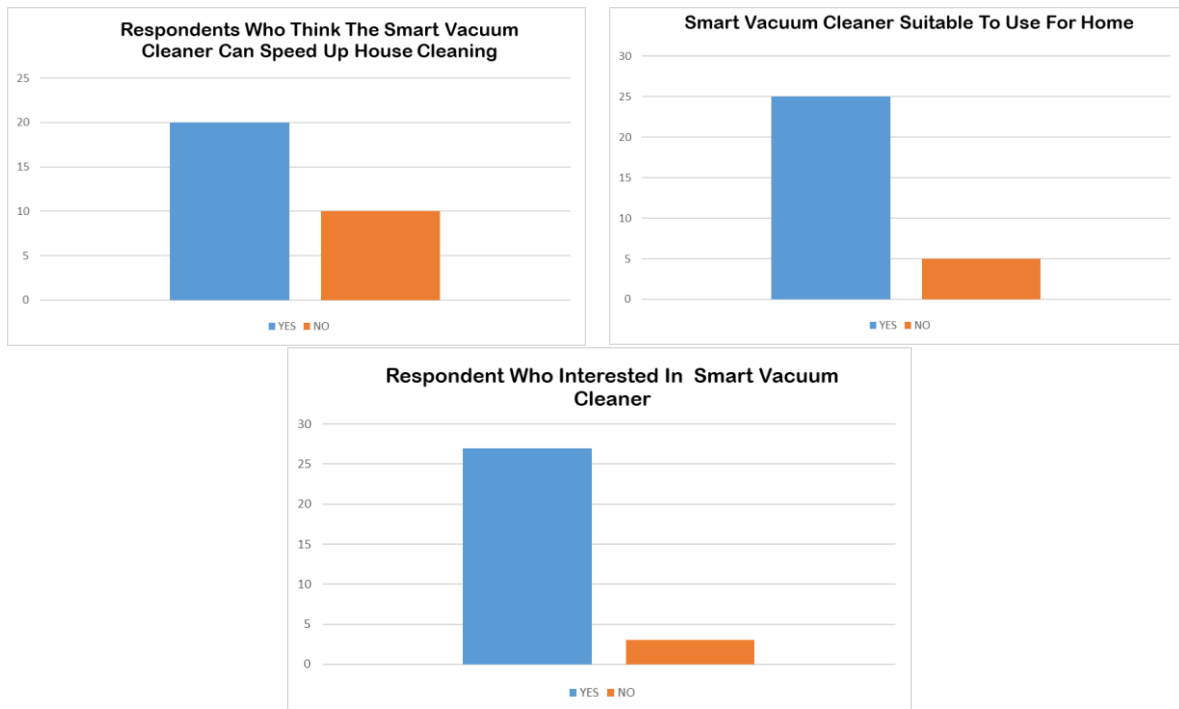
Every project has its own pros and cons, the pros will help the people and also the environment. However, the cons or the disadvantages must be improved or change for the future so that we could enhance the good and very efficient product that hardly to find disadvantage of the project.

Smart Cleaner Vacuum has a lot of advantages to help housewife and also the environment in the house. Besides of the advantages, this project also has their own disadvantages that we must overcome.

#### **4.3 ANALYSIS**

This analysis project has been taken from the analysis data we have taken from the general public as well as half of the housewives. This analysis aims to take into account the advantages and disadvantages, improvements that need to be made through the views of the public and housewives. This analysis is also very important for our products so that we can review and update our products according to the analysis that has been given by the public and housewives.





Above is the analysis that has been selected and made an important analysis for us to focus on and get some views from the public and housewives. First of all, from the analysis given, we get some respondents agree on can speed up house cleaning by using Smart Cleaner Vacuum. This is because, after we test our own products, users can speed up the cleaning work at home because the factor is this garbage collection system uses the system by direct garbage delivery by using vacuum. Usually housewives use brooms and shovels to do cleaning work. Too much time is taken from the garbage collection process alone and that will slow down the cleaning process at home.

Next, from the analysis we have obtained, this smart vacuum cleaner is very suitable for use at home. This is because, with a modest garbage collection capacity, the weight of the product is not too heavy and the size is not large, it is very suitable for use at home, especially in the kitchen area. This is also because, in the kitchen area, we often find onion skins and pieces of cooking ingredients after finishing the cooking work. With a small entry point and strong suction energy, this will further facilitate the cleaning work at home, especially in the kitchen area.

#### 4.7 CHAPTER'S SUMMARY

As a conclusion for this chapter, the analysis and findings have been made. This Smart Cleaner Vacuum has a lot of advantages however there are every cons to pros. Hence, the challenges are taken as a room for improvements and more developments for future generation and well as to enhance their knowledge on the project we carried out. Test run is carried out to determine the fullest potential of the vacuum to be working for cleaning proses that will be done as easier step.

*(Prepared by: Syed Amirul Hakimi Bin Syed Mohd Fuat)*

## **CHAPTER 5**

### **DISCUSSION , CONCLUSION AND UPGRADE PLAN**

#### **5.1 INTRODUCTION**

This chapter explains about discussion , conclusion and upgrade plan all together for the project . From the data from the test run of the project, the analysis have been done. Hence, the discussion from all the results of test run and analysis will be explain in this chapter. Then , the conclusion will be made based on the discussion and upgrade plan that have been made.

#### **5.2 DISCUSSION**

Based on the data we collected , we can agree to the fact that we need to make more effective of rubbish tank that can easier the flow of the process. This is because the process of rubbish flow are very difficult to transfer the rubbish. The process became difficult because the flow to the tank is more complicated is because we need know more details about the mass of the tank, the system from vacuum to the tank and the pressure of the vacuum. Thus , this causes the transfer of rubbish are need to do as manual step. However , if we replace the vacuum machine near to the rusbish ban or plastic, it will be more easier to transfer it.

Other than that , the way of the way about rubbish entered the nozzle should be better due to the problems that occurs afterward. The results of the nozzle vacuum was a bit not 100% of the rubbish can be cleaned. In order to avoid this results , the nozzle could be done by using proper customade plastic or iron plate to replace the enter nozzle for the vacuum hose. By using that way , hte entered system will become more smooth .

Furthermore, the piece of composite panel at the back side should be change. This is because the vacuum hub is difficult to replace at the pieace. However , this could be change if the composite panel are replace it with more thick piece and we must to make sure that the piece are strong to support the vacuum hub.By adding the support screw at the surface, it will be easier for the process of transferring the rubbish to the ban.

### **5.3 CONCLUSION**

Based on this through out project , it is confident to say that this Smart Cleaner Vacuum gives alot of benefits not to just humans , but also the environment in the house. Plus , with all the convenient that this Smart Cleaner Vacuum offers to the amputees , it will help them alot especially in process of cleaning in the house. In hopes that this project could make it to the government and non-government office or facotry, to be widely use by all amputees , because it will greatly leave a positive effects to the environment and also human. All the upgrades and improvements will be made so that this project could give more benefits and advantages . Hence, hope that this project could expand even more through out all the upcoming generations.