**DIPLOMA IN MECHANICAL ENGINEERING**

**PROJECT 2**

**DJJ40182**

**FINAL YEAR PROJECT REPORT**

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**DECLARATION OF AUTHENTICITY AND PROPERTY RIGHTS**

**AGRICULTURAL WHEEL HOE**

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2. We acknowledge that the 'Project Above' and the intellectual property contained therein are the result of our original work/invention without taking or copying any intellectual property from other parties.

3. We agree to relinquish ownership of the 'Project' interlock property to 'the Polytechnic' to meet the requirements for the award of a Diploma in Mechanical Engineering to me.

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## APPRECIATION

Thankfully, to the almighty with His Grace, we have succeeded to complete our final year project assignment successfully. Our deepest gratitude to my supervisor Encik MohaD Hazwan Bin Mohamed Norli, who gave us the opportunity to complete this project for one year and greatly assisted and assisted us in completing the final project work. Without the encouragement and guidance of Encik Mohd Hazwan Bin Mohamed Norli, we would not be able to complete the work within the time specified by the Polytechnic. All the instructions provided apply to the final project and can be applied outside the Polytechnic. In addition, we would also like to thank the lecturers who have taught us a great deal about our project in the classroom or in the workshop. The Polytechnic of Banting Selangor is also not missed because it gives us an opportunity to further our ideas in innovating existing goods for the better. Last but not least, the friends who helped us both directly and indirectly.

**ABSTRACT**

The majority of the agricultural equipment on the market today is often large, expensive, and heavy. Due to the size, weight, and expense of the technology, some farmers seldom ever purchase agricultural equipment, such as Rotary Tillers for walking Tractors. It will be challenging for the farmer to work in the heat, and working too long will make them sick and give them back discomfort. Farmers also need a lot of time to do their task. The main goal of this study is to identify a solution for the development of a smaller, more compact, less expensive, and simpler wheel hoe for a vegetable farmer, as well as to provide comfort for farmers while they work, shorten working hours, and use less labour to maintain crop borders. Steel plate, construction steel, a wheelbarrow bolt nut, a washer, anchor spray, and a shaft are the components employed. Cutting, welding, grinding, drilling, and finishing procedures all employ fabrication techniques to some extent. The findings of the Agricultural Wheel Hoe indicated that the farmer may create two borders simultaneously at that time. In accordance with the flowchart and schematic created by our inventor for our proposal, we successfully developed and completed the project. In conclusion, small-scale farmers may utilise the agricultural wheel hoe tool, and the outcomes demonstrate how a farmer's working time can be decreased, including energy savings, and can provide comfort while using the agricultural wheel hoe.

## 1.1INTRODUCTION

Since ancient times, cultivating and tilling have been facilitated by the use of a wheel hoe as a gardening implement. It usually includes of a wheeled frame with one or more adjustable attachments, such a cultivator blade, hoe, or tiller, to fit the depth and breadth of the garden rows. The wheel hoe is made to be pushed and propelled forward, enabling the attachments to weed out and cut through the soil while also loosening the soil for greater water and aeration penetration. When it comes to maintaining healthy, rich soil for their plants while avoiding the use of chemicals and pesticides, organic gardeners frequently use this instrument. The wheel hoe is still a common tool because of its straightforward design and ease of use the wheel hoe is still a favourite tool among many gardeners today. An essential step in getting the grow space ready for new plants is tilling the soil. The wheel hoe can occasionally be utilised for supplemental tillage. With the use of rotating discs, motorised wheel hoes can delicately spin the soil to get rid of weeds without damaging the crops. The soil can also be aerated with wheel hoes. This tool's main benefit is that it removes weeds without interfering with photosynthesis. The planter can remove insects and other pests by digging further into the growing area with the wheel hoe. To safeguard more fragile plants in humid areas, it is essential to constantly till the soil whenever it becomes wet.

## 1.2 PROJECT BACKGROUND

For generations, gardeners have used the wheel hoe as a tool to help in weeding and cultivating in fields and gardens. It is made out of a wheel with a handle attached to it and some blades or tines that are placed directly above the wheel. The wheel hoe has a long history, and there is proof that similar instruments were used in ancient Egypt, Greece, and Rome. These early models generally featured basic blades or tines for weed removal and soil aeration and were constructed of wood. To make the labour simpler, animals like oxen or horses were frequently used to pull them. The wheel hoe kept changing throughout time as many producers introduced their own styles and modifications Modern wheel hoes come with adjustable blades and accessories for different gardening chores and are built of sturdy materials like steel and aluminium. Home gardeners and small-scale farmers, especially those engaged in organic or sustainable agriculture, continue to find use for the wheel hoe. It may be a useful tool for maintaining healthy gardens and increasing agricultural yields while using less chemical pesticides thanks to its manoeuvrability, adaptability, and simplicity of usage.

## 1.3 PROBLEM STATEMENT

Agricultural equipment, such as tractors, combines, and harvesters, are essential tools for farmers to efficiently manage large-scale crops and livestock. However, the use of these machines can also present a number of potential problems. One problem is that the cost of purchasing and maintaining agricultural equipment can be prohibitively high, making it difficult for small-scale farmers to compete in the market. Another problem is the operation of agricultural equipment requires a certain level of skill and knowledge, which may not be accessible to all farmers, especially those in developing countries. Therefore, a new solution which is agricultural wheel hoe. Firstly, it may save time and work in the garden because it is a flexible and effective instrument. Gardeners may swiftly and simply cultivate and ready soil for planting by using a wheel hoe. Second, by minimising soil disturbance and lowering compaction, the usage of a wheel hoe can aid in enhancing soil health. Wheel hoes do not dig as deeply into the soil as certain other gardening equipment, such as tillers, which can disturb the natural structure and have a detrimental effect on the health of the soil.

## 1.4 PROJECT OBJECTIVE

The objective of this study was to design a Agricultural Wheel Hoe. The following is a list of some of the objectives to achieved:

1) To design a wheel hoe to use in tilling and cultivating in single equipment using 3D Inventor Software.

2) To fabricate and test the Agricultural Wheel Hoe to use in agricultural work.

3) To provide an affordable tool for small scale farmers to maintain healthy and productive gardens.

## 1.5 PROJECT ISSUES

There are various machines used in agriculture, and each type may have its own unique issues. Here are some common challenges that can arise with agricultural machines:

1) **Maintenance and servicing:** For agricultural machinery to continue running efficiently, regular maintenance and service are required. However, finding qualified technicians or replacement components, as well as the time and money needed for maintenance, can be difficult. These problems can be resolved by streamlining maintenance methods, giving clear instructions, and increasing the accessibility of replacement parts.

2) **Operator training and skill requirements:** Operating agricultural machinery often requires specialized knowledge and skills. Insufficient training or inexperienced operators can result in accidents, damage to the machine, or suboptimal performance. Offering comprehensive training programs and clear user manuals can improve operator proficiency and safety.

3) **Cost and affordability:** It might be difficult for small-scale farmers or those with limited resources to invest in cutting-edge technology due to the high cost of agricultural gear. Creating affordable substitutes or putting in place leasing and renting programmes can increase accessibility and affordability for a larger variety of farmers.

## 1.6 PROJECT SCOPE

The scope of a wheel hoe is limited to specific types of gardening and farming tasks and may not be suitable for all situations. Some of the limitations of a wheel hoe include:

1) **Soil type:** For optimal results, use a wheel hoe on loose, friable soil. A wheel hoe could not function well if the soil is excessively compacted or hard.

2) **Garden size:** Wheel hoes are helpful for small-scale farming and gardening, but bigger enterprises or fields may not be suitable for them.

3) **Depth of cultivation:** Wheel hoes are made for shallow cultivation; they may not work well for deep tilling or removing hardpan soil layers.

## 1.7 THE IMPORTANCE OF THE PROJECT

The wheel hoe holds significant importance in agriculture for several reasons:

1) **Efficient Weed Control:** For vital resources like water, nutrients, and sunlight, weeds compete with crops. For crops to remain healthy and produce their highest yields, effective weed management is essential. Farmers may quickly move between rows while using the wheel hoe to uproot or chop weeds with its blades or tines. Its design makes it possible to remove weeds precisely and strategically, minimising crop damage and the need for chemical pesticides.

2) **Sustainable and Environmentally Friendly:** The wheel hoe is a manual tool that doesn't require gasoline or electricity to operate, making it an environmentally beneficial option. By lowering reliance on machinery that produces greenhouse gases and uses non-renewable resources, it helps promote sustainable agricultural practises. The wheel hoe promotes organic farming practises and aids in environmental protection by minimising the use of chemical herbicides.

3) **Cost-effective and Accessible:** For small-scale farmers or those with limited resources, the wheel hoe offers an affordable and accessible option for effective cultivation. It is considerably more affordable than larger agricultural machinery, making it an attractive choice for farmers with smaller cultivation areas. Additionally, its manual operation allows for greater control and precision, enabling farmers to tend to their crops efficiently without heavy machinery expenses.

## 1.8 DEFINITION OF TERMS

1) **Wheel Hoe:** A gardening tool consisting of a wheel with a handle attached to it and blades or tines positioned just above the wheel. It is used for cultivating, tilling, and preparing soil in small-scale agriculture.

2) **Soil Preparation:** The act of getting the soil ready for planting by removing debris, breaking up compacted soil, and creating a loose, well-aerated seedbed. The wheel hoe is used to prepare the soil for optimal seed germination and root growth.

3) **Furrowing:** Creating long, narrow trenches or furrows in the soil for planting seeds or setting transplants. The wheel hoe can be equipped with attachments that enable farmers to create furrows of consistent depth and spacing.

4) **Cultivating:** The process of mechanically stirring or loosening the soil around growing plants to control weeds, aerate the soil, and improve nutrient uptake. The wheel hoe's blades or tines are used for cultivating around crops, breaking up soil crusts, and uprooting shallow-rooted weeds.

5) **Tilling:** the process of mechanically breaking up and turning over the soil in preparation for planting or cultivation. It is a common practice in gardening and agriculture to create a loose and well-aerated seedbed, remove weeds or unwanted vegetation, and incorporate organic matter or amendments into the soil.

6) **Blades:** The cutting or digging edges attached to the wheel hoe. They come in different shapes and sizes, such as stirrup-shaped blades, oscillating knives, or scuffle hoes. Blades are used for cutting through weeds, breaking up soil, and creating furrows or trenches.

## 1.9 SUMMARY

The wheel hoe is a versatile and efficient tool used for various agricultural tasks. It excels in weed control by allowing farmers to navigate between rows and cut or uproot weeds with precision. Its blades or tines are designed to break up compacted soil, creating a loose and well-aerated seedbed. This promotes seed germination, root growth, and nutrient uptake, leading to healthier and more productive crops.

The wheel hoe is adaptable to different farming practices, such as intercropping and succession planting. It enables farmers to work in tight spaces and manage multiple crops with ease. With interchangeable blades and attachments, the wheel hoe can be customized for specific tasks like furrowing, cultivating, or creating raised beds.

In addition to its functionality, the wheel hoe is sustainable and cost-effective. It operates without the need for fuel or electricity, reducing environmental impact and machinery expenses. It supports organic farming principles by minimizing the use of chemical herbicides, promoting natural weed control methods.

Throughout this we have achieved in showcasing each and every topic. Also be able to identify the problem statement and we also be able to clarify the objective of this project clearly. Furthermore, we also well construct the scope of this project clearly above.

# CHAPTER 2

## 2.0 LITERATURE REVIEW

### 2.1 INTRODUCTION

Literature means research articles that are referred to understand and study the research issues. The literature review is used to provide contextual studies by looking at the research that has been conducted in the field of research and not just summarizing the research conducted by other researchers. In addition, through the study of the literature the researcher can also identify the weaknesses and strengths of the resulting project. Therefore, the literature review is important as it can be used from several aspects as a guide and reference for the researcher in completing this study. The literature review is essential to commence our invention of a design to fit the objective of the project. This research is important so that there is no duplication of existing projects. In addition, it also helps students to gain access to information about the success of the project and to ensure that it can run properly, it is necessary to obtain information about the project, to meet the objectives that have been submitted. This chapter contains the different types of materials to meet the necessary features used to produce an effective design rather than the previous design. This process is important for the quality of the product to be more effective and more robust and satisfactory. For our project, we developed a wheel hoe which is a versatile and efficient tool for small-scale gardening. Other than that, we guarantee that our Agricultural Wheel Hoe is easy to assemble, operated and maintained by anyone, even beginners. Lastly, we will utilize all our resources and information that we gathered and learned during our time in Polytechnic Banting Selangor to complete this project on a good note.

## 2.2 PREVIOUS DESIGN / RESEARCH WORK

### HANDHELD TOOLS

In agriculture, the use of portable equipment has been crucial for farmers to effectively do a number of activities. Here is a summary of the history of prior research on portable agricultural equipment.

Since prehistoric times, handheld instruments have been employed in agriculture. Early tools like sickles, scythes, and hoes were used for activities including crop harvesting, grass cutting, and soil tilling. Usually, these implements were constructed of metal, stone, or wood. The specialised and sophisticated design of portable agricultural implements increased over the mediaeval and early modern eras. Sickle and scythe blade designs were enhanced, and more ergonomic handles for better productivity and less fatigue were developed.

Agriculture-related research has concentrated on the effectiveness and ergonomics of handheld instruments. Studies on how to lessen hand fatigue and increase productivity have looked at handle designs, weight distribution, and grip materials. Tools that are ergonomically constructed can enhance agricultural workers' general comfort and help reduce musculoskeletal problems. Research has also concentrated on portable equipment that promote organic and sustainable farming methods. For instance, cultivators and hand weeders may effectively eradicate weeds without the use of pesticides, lowering chemical inputs and boosting ecologically responsible agricultural practises.

For the use of handheld equipment in agriculture, research has been done to provide training programmes and enhance safety precautions. To prevent accidents and injuries, training emphasises safe work practises, correct tool usage, and maintenance. Research has looked into improvements in material technology to increase the performance and durability of handheld agricultural implements. Utilising durable yet lightweight materials, such carbon fibre or composites, can lengthen the useful life of a tool and lessen user strain.

## GARDEN TILLER

Garden tillers, often referred to as rototillers or cultivators, are mechanical implements used in gardens and small-scale agricultural settings for breaking up and cultivating soil. Here is a summary of prior studies on garden tillers in history.

The idea of tilling the soil has been around for a very long time. For soil cultivation in the past, manual instruments like hand hoes, mattocks, and ploughs were utilised. These instruments had a limited capacity to efficiently cover huge areas and needed a lot of manual work. The 19th century saw the development of the first mechanised garden tillers. Early versions frequently used steam engines or were horse-drawn. on contrast to modest gardens, these early tillers were big and mostly employed on agricultural areas.

The Troy-Bilt firm unveiled the Garden Way tiller in the 1930s, marking a turning point in the development of garden tillers. The Garden Way tiller's self-propelled design and rear-mounted tines made it simpler for gardeners to use and more mobile in confined situations. Since the Garden Way tiller was first introduced, other businesses have created their own versions with different functions and aesthetics. There are several sizes, power sources (gasoline, electric or battery-powered), and configurations (front-tine, rear-tine or vertical-tine) for modern garden tillers.

Garden tillers have changed greatly throughout time, providing small-scale farmers and gardeners with a useful and practical tool for soil preparation. Their design continues to be optimised, environmental effects are reduced, and sustainable gardening methods are promoted.

## WHEEL HOE

A manual gardening tool called a wheel hoe has been used for generations to cultivate soil, get rid of weeds, and make seedbeds. Here is a quick summary of its background and earlier studies. Agricultural equipment with wheels have been used since prehistoric times. According to archaeological evidence, wheel hoes were first employed for farming and gardening by ancient civilizations including the Egyptians, Greeks, and Romans.

Wheel hoes have undergone study and advancements over time thanks to the efforts of agricultural experts and tool makers. Research has concentrated on improving attachment choices, handle ergonomics, and blade designs to boost productivity and lessen user stress. The increased interest in small-scale farming, sustainable agriculture, and organic gardening has led to a rise in the use of the wheel hoe in recent years. Some businesses have unveiled updated versions of the wheel hoe that offer ergonomic designs, lightweight materials, and customizable functions.

The wheel hoe has a number of benefits for gardening and agricultural work. It aids in weed removal, soil aeration, and planting furrow formation. In comparison to conventional hand tools, the wheel's rotation makes it easier to manoeuvre throughout the field. The interchangeable blades and accessories offer flexibility for a range of jobs. By minimising the use of chemical herbicides and minimising soil disturbance, the wheel hoe is in line with sustainable farming techniques. It enables accurate and focused weed removal while protecting valuable soil organisms and minimising environmental effects.

In summary, the wheel hoe has a long history and has been important in sustainable agriculture, gardening, and small-scale farming. For many farmers and gardeners throughout the world, its versatility, efficacy, and eco-friendliness have made it an invaluable tool.

## 2.3 CONCEPT AND THEORIES

The design of the wheel hoe, a manual implement that has been used in agriculture for millennia, is based on a number of ideas and beliefs about productive and sustainable farming methods. Ergonomics is one of the fundamental ideas and theories that guides the creation and use of the wheel hoe. The ergonomics, or the study of how to build tools and equipment that are pleasant and effective for human use, is the foundation for the design of the wheel hoe. The wheel hoe is made to be portable, simple to use, and easy on the user's arms and back.

Sustainable agriculture follows. A low-tech, inexpensive instrument that may be utilised for sustainable agricultural methods is the wheel hoe. The wheel hoe can assist in decreasing the negative effects of agriculture on the environment by lowering the demand for fuel-powered equipment and chemical herbicides. Mechanical advantage follows that. The wheel hoe is made to maximise efficiency during cultivation and tilling by utilising the user's body weight and movement. The user may simply break up dirt and eliminate weeds by driving the wheel hoe ahead with the aid of a motor engine and applying downward pressure with their body weight.

Overall, the wheel hoe design and operation are based on the idea of developing a productive and long-lasting instrument for tilling soil, cultivating it, and raising crops. The wheel hoe is a straightforward yet useful instrument that may assist gardeners and farmers in minimising their negative environmental effects and achieving wholesome, sustainable crop development.

## 2.4 TYPES OF AGRICULTURE MACHINE

1)


**Figure 2.1 Plantation Tractor**

Tractors are adaptable tools used in a variety of agricultural tasks. For operations like plough, till, plant, harvest, and transport of agricultural commodities, they can be fitted with a variety of attachments and equipment.

2)


**Figure 2.2 Mini Tractor**

A mini tractor is a more compact and adaptable variation of a standard agricultural tractor. It is also referred to as a compact tractor or tiny utility tractor. On small farms, in gardens, or in other light-duty agricultural or landscaping activities, it is made to carry out a range of jobs.

3)


**Figure 2.3 Hand Push Tractor**

A hand push tractor, also known as a walk-behind tractor or hand tractor, is a manual, human-powered agricultural machine used for various tasks on small farms or gardens. It is designed to be pushed or pulled by an operator, providing the necessary power to perform a range of agricultural operations.

## 2.5 TYPES OF SOIL IN AGRICULTURE

1)

**Figure 2.4 Silt Soil**

Silt is made up of rock and other mineral particles that are smaller than sand but larger than clay and is known to have significantly smaller particles than sandy soil. The soil holds water better than sand because it is smooth and fine. Silt is frequently found next to rivers, lakes, and other bodies of water because it is easily carried by flowing currents. In comparison to the other three types of soil, silt soil is the most fertile. In order to increase soil fertility, it is also utilised in agricultural practises.

2)

**Figure 2.5 Loam Soil**

The fourth kind of soil is loam. It combines sand, silt, and clay so that the advantageous qualities of each are present. For instance, it can hold onto nutrients and moisture, making it more ideal for cultivation. Due to the balance of all three types of soil materials

sandy, clay ,and siltas well as the presence of humus, this soil is also known as agricultural soil. Due to its inorganic nature, it also has increased calcium and pH levels in addition to these.

3) 

**Figure 2.6 Sandy Soil**

Due to the size of the particles, sandy soil has a gritty feel. Because of the vast intervals between the soil's particles and its coarse texture, water can drain effectively. This affects how much water the soil can store, which may be both a benefit and a drawback.

## 2.6 COMPARISION OF OUR PRODUCT WITH LATEST TECHNOLOGY

| TYPES OF MACHINE |  |  |
|---|---|---|
| **SIZE** | Small and Lightweight | Big and Heavy |
| **POWER SOURCE** | Petrol Oil | Petrol Oil |
| **MAINTENANCE** | Easy | Moderate |
| **COST** | RM 450 | RM 5633 |
| **EFFICIENCY** | More Efficiency | Less Efficiency |
| **LAND AREA** | Less than 1 Acre | More than 1 Acre |
| **NOISE LEVEL** | Loud | Loud |

Table 2.1 Comparison Of Agriculture Wheel Hoe And Hand Push Tractor

## 2.7 INDUSTRIAL APPLICATION

The wheel hoe is a gardening tool that is mostly used in agricultural and horticultural applications. It is designed to cultivate the soil and remove weeds by pushing or pulling it along rows or beds of plants. The wheel hoe is commonly used in various settings, including:

1) **Home gardens:** Wheel hoes are popular among home gardeners who have relatively small plots of land. They can efficiently manage weed control and soil cultivation in flower beds, vegetable gardens, and other small-scale gardening areas.

2) **Organic farming:** The wheel hoe is often favour by organic farmers who prioritize environmentally friendly and sustainable farming practices. It allows them to manage weeds without relying on chemical herbicides, promoting natural weed control methods

3) **Market gardens:** Market gardeners, who cultivate crops for direct sale at local markets, find wheel hoes beneficial for maintaining their plots. The tool helps keep the rows tidy, remove competing weeds, and aerate the soil for optimal plant growth.

4) **Small-scale farms:** Farmers use wheel hoes to prepare the soil, remove weeds, and cultivate rows of crops such as vegetables, herbs, and flowers. It is particularly useful in situations where manual labor is preferred over larger machinery.

Figure2.7 Home Gardens

Figure2.8 Organic Farming

Figure 2.9 Market Gardens

## 2.8 COMMERCIAL VALUE STUDY

A commercial value study of the wheel hoe in agriculture would involve an analysis of the economic benefits and potential profitability of using this tool in farming and gardening operations. The study would typically involve the following steps.

**Identify the target market**. The first step is to identify the target market for the wheel hoe. This could include small-scale farmers, community gardens, and home gardeners

**Assess market demand.** Next, the study would assess the level of demand for the wheel hoe in the target market. This could involve surveying potential customers or analyse sales data from existing suppliers.

**Analyse competition.** The study would also analyse the competition in the market for manual gardening tools, including the pricing and features of competing products

**Evaluate market expansion opportunities.** Finally, the study could evaluate opportunities to expand the market for the wheel hoe, such as by developing new marketing channels or partnering with related businesses in the gardening industry.

A commercial value analysis of the wheel hoe in agriculture would primarily provide light on the economic viability of manufacturing and marketing this item as well as suggest ways to increase profitability and market penetration.

## 2.9 SUMMARY

As a summary of this topic, we have achieved in explaining each and every subtopic as we mentioned in the introduction. Furthermore we have provided some diagram together with our statement to support the information we have stated. Moreover, we also going to discuss about the flow of the project, the organization chart and Gantt chart in the following topic which is methodology

# CHAPTER 3

# 3.0 METHODOLOGY

## 3.1 INTRODUCTION

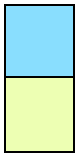
In this chapter, we will look at the project's procedure and comprehend the scope of the project. In this chapter, we will extensively explore the flow of this project by defining each person's position in the group and explaining the flow of how this project would operate in a simple word with a flow chart. We will also indicate in a table the estimated cost we will spend during this project, as well as the preparation we have done to complete the project and the project report with a Gantt chart evaluation. Lastly, we have submitted our project's sketching of design which roughly be after.

## 3.2 GANTT CHART

This shows a Gantt chart in our project production process starting from the first week until the 15th week. A graph in which a succession of horizontal lines depicts the quantity of work or output performed in particular time periods in proportion to the amount anticipated for those times.

| Week / Project Activities | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Market Research | | | | | | | | | | | | | | |
| Brainstorming | | | | | | | | | | | | | | |
| Specify Detail Requirements | | | | | | | | | | | | | | |
| Sketch & Design | | | | | | | | | | | | | | |
| Material Selection | | | | | | | | | | | | | | |
| Fabrication | | | | | | | | | | | | | | |
| Testing | | | | | | | | | | | | | | |
| Analysis | | | | | | | | | | | | | | |
| Report | | | | | | | | | | | | | | |
| Presentation | | | | | | | | | | | | | | |

Table 3.1

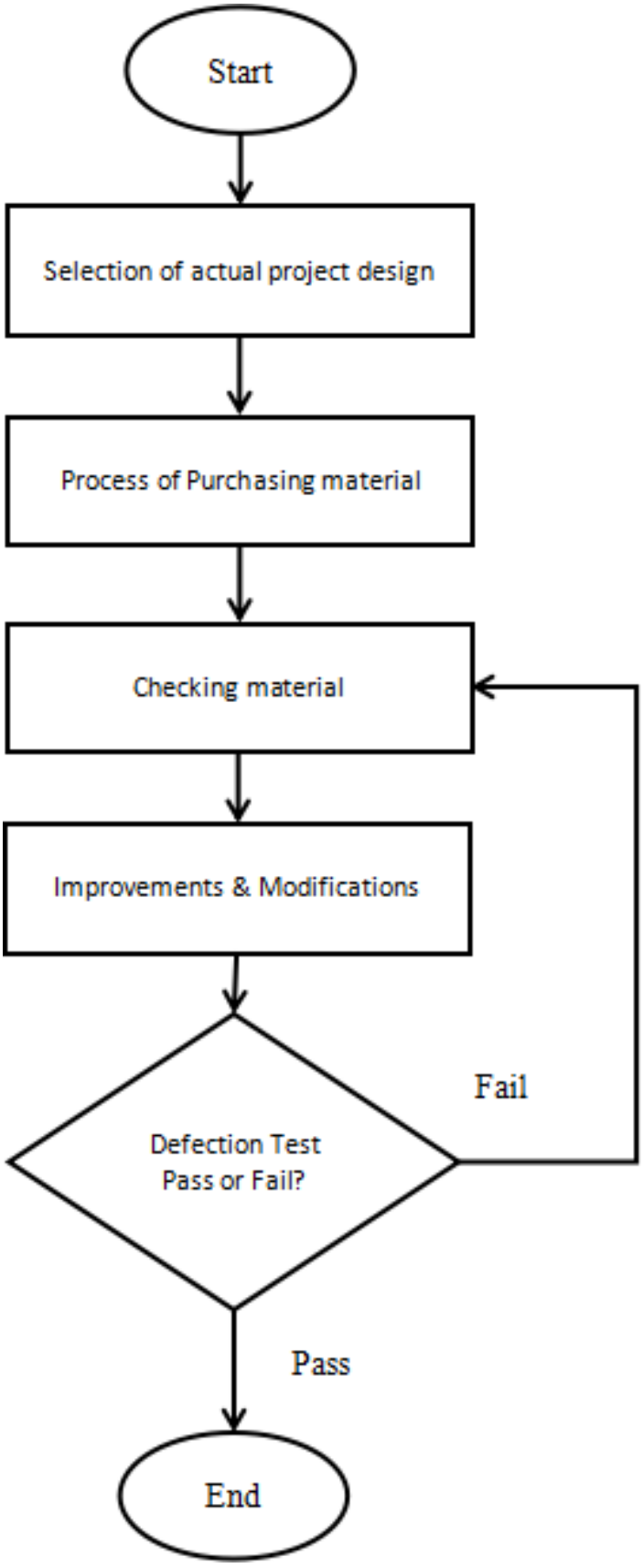


Planning

Implementation

Based on the Gantt chart shown above, the yellow box is the time we expect to do. While the orange one, shows the actual time we did the task. If it can be observed every task that we plan to do in a certain period has lasted for a week. This is because at the beginning of the semester we faced some obstacles in doing face -to -face classes, as well as items purchased arriving later than expected. This resulted in a one week delay from the period we were supposed to complete the task we planned to complete within 14 weeks.

## 3.3 FLOW CHART OF PROJECT



### 3.3.1 FLOW CHART EXPLANATION

First of all, we choose the actual project design. Based on the research and studies we have conducted, we have chosen a project design that is highly eco-friendly to the user. This is due to its efficiency which can help in easy movement across the field and allowing faster cultivation. This efficiency can save time and effort.

The next is the process of purchasing materials. Before we buy the material of our project, we have made a list of material that we need to buy according to the budget we set, which is below RM750. Therefore, the selection of materials is very important so that we do not overload when buying project items. All aspects have been taken into account when purchasing the material including the price and durability of the material in accordance with the small agriculture field.

After that, we must check the material that has been purchased. We need to look in terms of quantity and quality according to the planned project. In terms of quantity, we need to check whether the quantity of materials like cultivator, tiller, engine motor, shaft and body frame are sufficient or not. The project we produce is agriculture machine, so it is important that we use a material that can withstand with the vibration of engine motor and soil texture. We use motor engine with torque 6500rpm and 52cc displacement.

Next, we make improvements and modifications. After reviewing the materials needed to produce the project, we proceeded with the project production process. First of all, we have made the basic body frame using a steel that we bought which length 2 metre. Then, we cut the steel with appropriate length of body frame. The function of the body frame to support and stabalize the various components of the wheel hoe. Therefore in this process of improvement and modification, we will make improvements and modifications from time to time to achieve the project objectives that we need to achieve.

Finally, the defection test process. We need to make sure whether the project we produce passes or fails. For the project we pass from this deflection test, we will see in terms of whether the engine motor can give high torque to loose the soil and the cultivator attached on the shaft is fit perfectly. Since our project needs to be placed in small agriculture field, it is important for us to ensure that the project is durable with the place. If there are no defects during the testing process, the project is considered passed and completed. Meanwhile, if there are any

defects during the testing process, then we need to repeat the process of checking the material in order to solve all the problems in this project.

## 3.4 PROJECT DESIGN

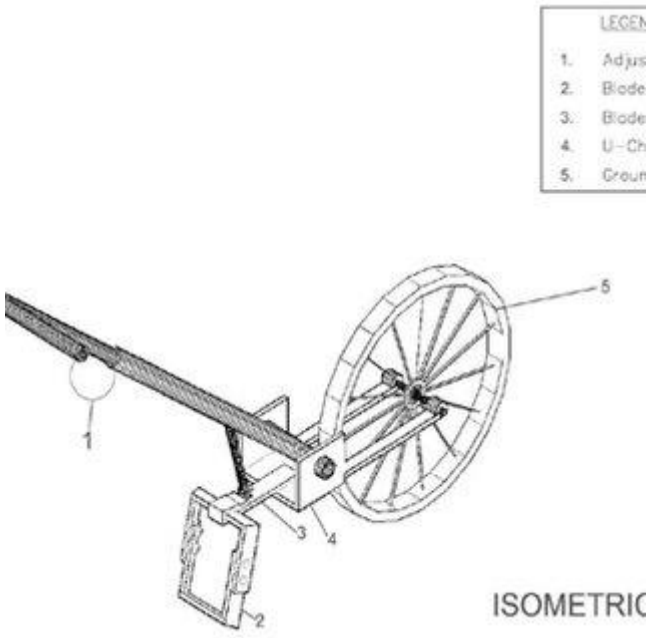
| Old Design | Our Design |
| --- | --- |
|   |  |

Table 3.2

## 3.5 EQUIPMENTS

| Equipment | Diagram |
|---|---|
| Spanner |  |
| Allen Key |  |
| Screwdriver |  |

| | |
|---|---|
| Grinder |  |
| Arc Welding |  |
| Playar |  |

Table 3.3

## 3.6 COST ESTIMATION

| No. | Item | Quantity | Cost per item | Total (RM) |
|---|---|---|---|---|
| 1 | Cultivator | 1 | 115 | 115 |
| 2 | Aluminium Pipe | 1 | 43 | 43 |
| 3 | Clash Case | 1 | 20.40 | 20 |
| 4 | Wheel | 1 | 35.80 | 2 |
| 5 | Upper Frame Body | 1 | 18.70 | 18 |
| 6 | Middle Handle | 1 | 25 | 25 |
| 7 | Upper Handle | 2 | 19.20 | 19.20 |
| 8 | Engine Motor | 1 | 160 | 160 |
| 9 | Throttle Control | 1 | 27.90 | 27.90 |
| 10 | Screw | 8 | 1 | 8 |
| 11 | Nut | 8 | 1 | 8 |
| 12 | Welding | 1 | 30 | 30 |
| **Total (RM)** | | | | **510.60** |

Table 3.4

## 3.7 DATA GATHERING METHOD

We gather information for a wheel hoe through online surveys, in-person interviews, and field observations. First, an online survey. To create an online survey, we employ a platform like Google Forms. To acquire information about the usage, preferences, and experiences of wheel hoe users, a survey was created. Field notes will come next. Visit public gardens, farms or gardening events to acquire field data about the use of wheel hoes. Observe how people utilise wheel hoes, the tasks they use them for, and any problems they run across. Take notes and record any enlightening or fascinating comments. The sample question for our Google Form survey is depicted in the picture below.

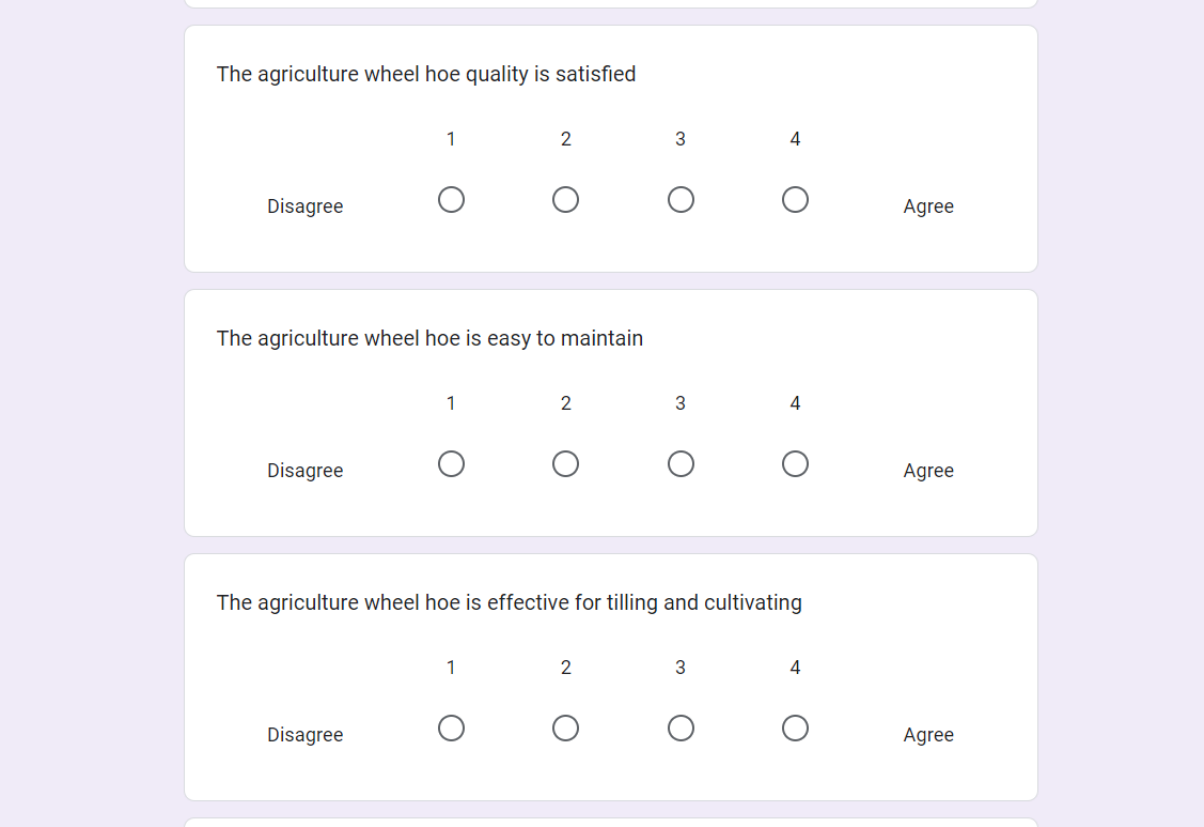



Figure 3.1

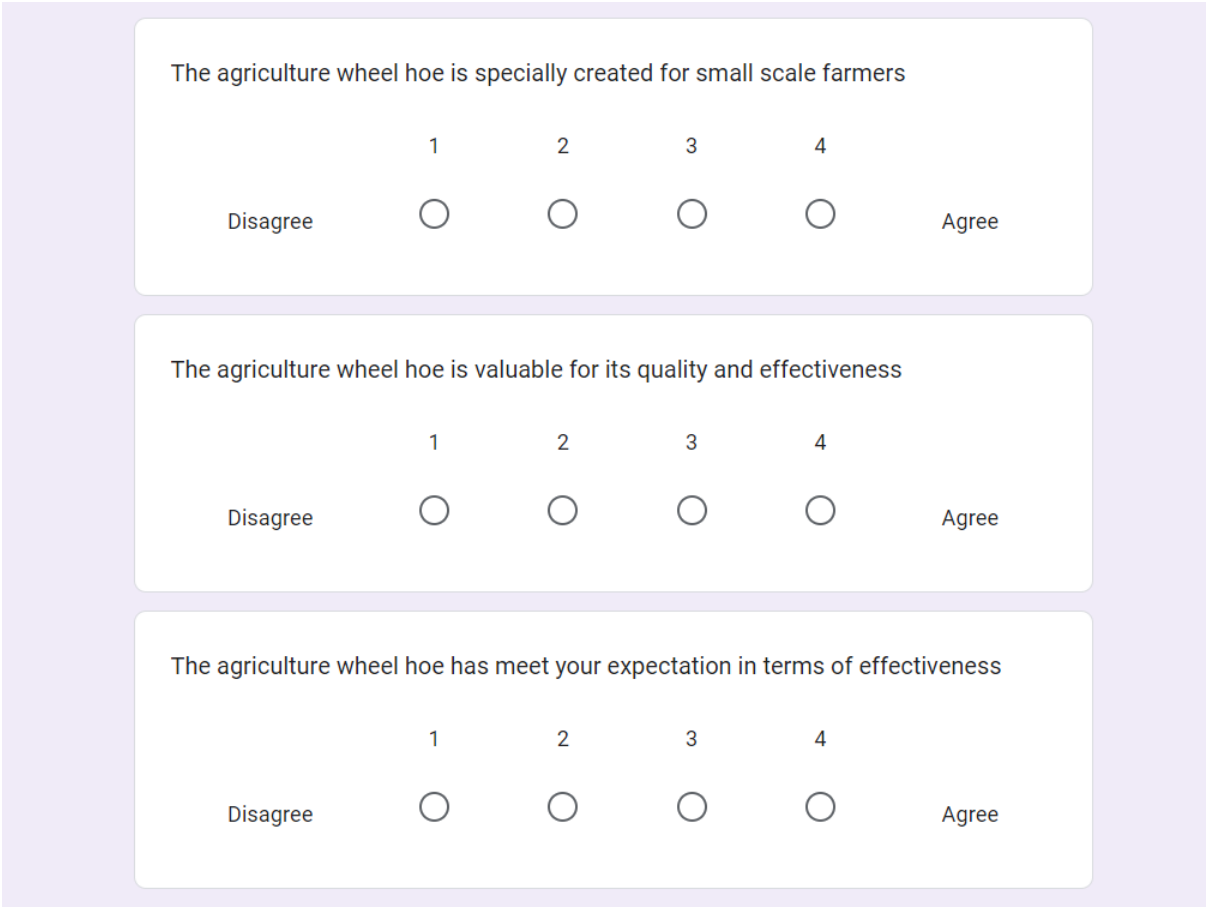



Figure 3.2

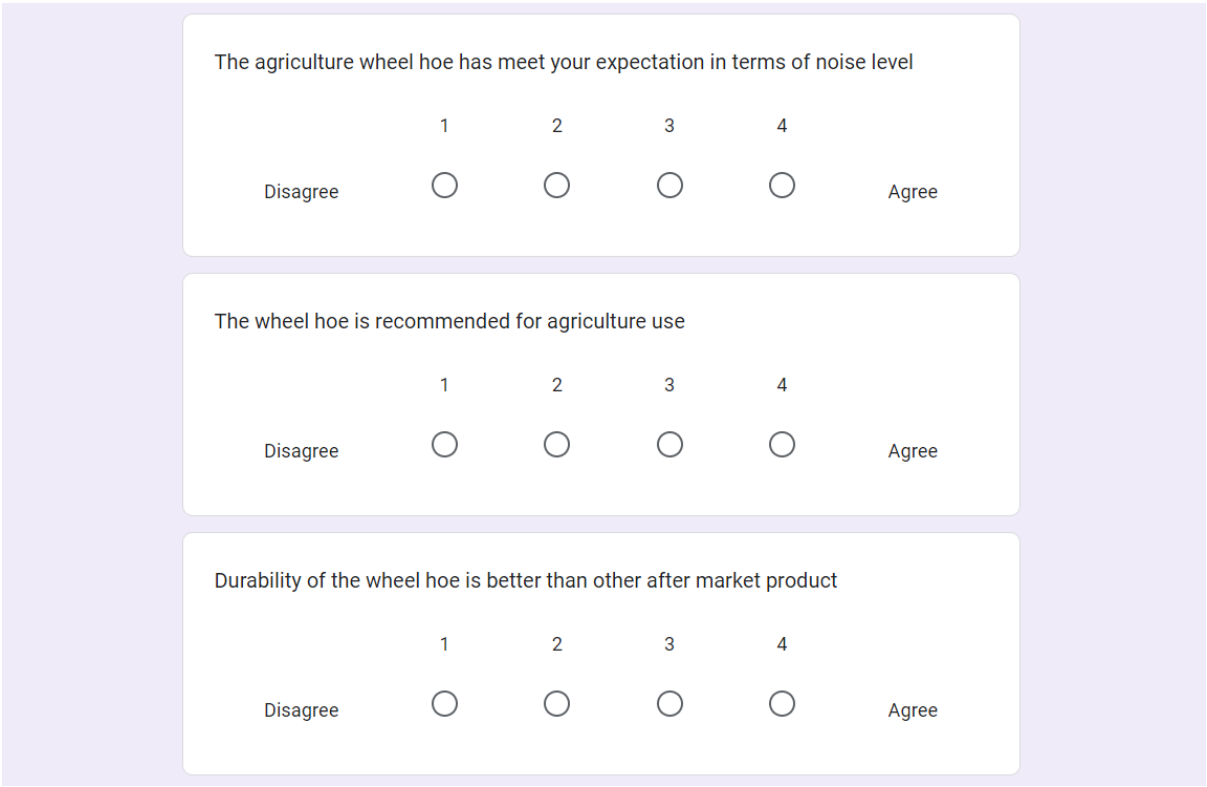



Figure 3.3

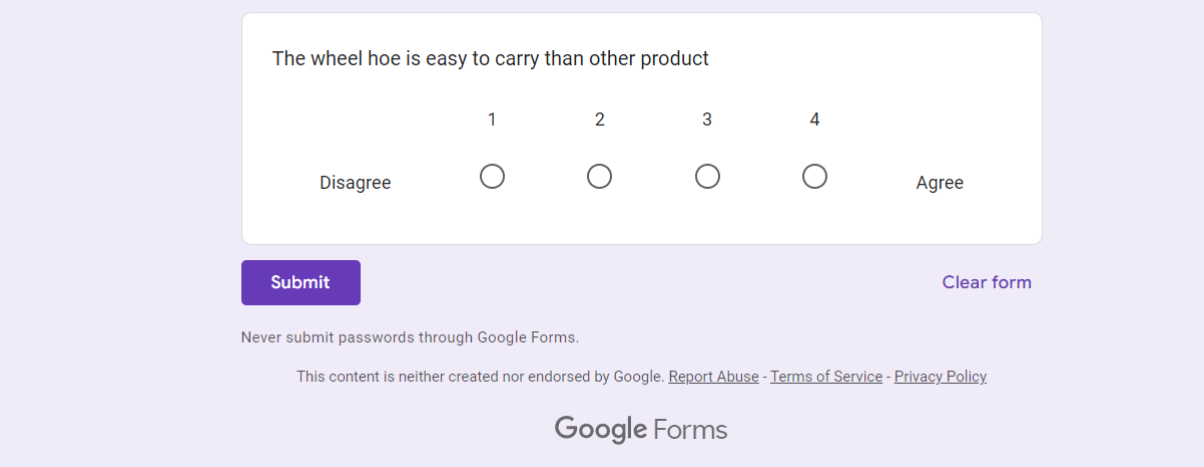



Figure 3.4

The summary for using Google Forms to gather data about wheel hoes is as follows. Create a survey using the Google Forms tool with the express purpose of gathering data on wheel hoes**.** Form Questions, include inquiries regarding the participants' degree of knowledge, use frequency, jobs completed, favourite brand or model, key attributes, difficulties encountered, and ideas for improvement. Create a customised version of the form, then distribute it through email, social media, gardening forums, or in cooperation with gardening organisations.

## 3.8 PROJECT DRAWING

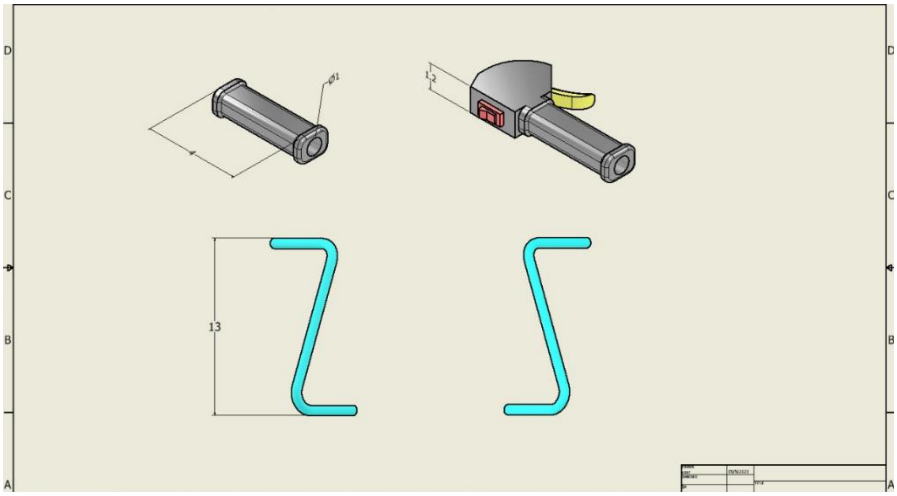



Figure 3.5 Throttle Control Design

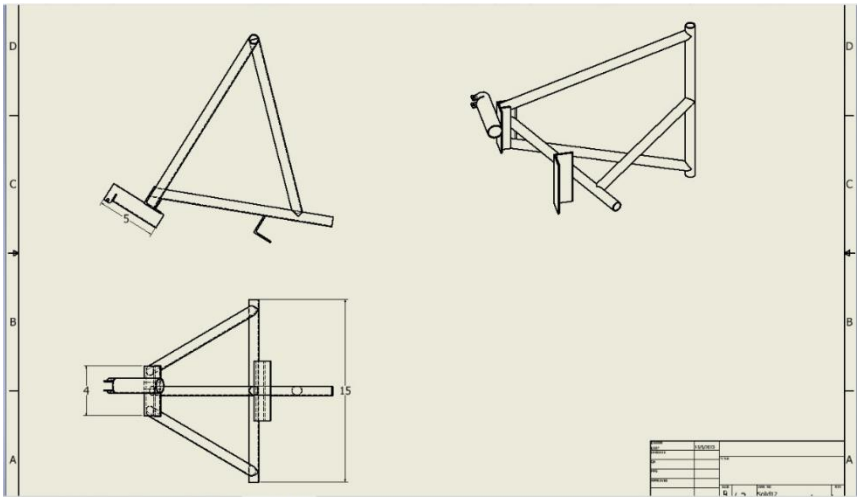



Figure 3.6 Upper and Lower Frame Body Design

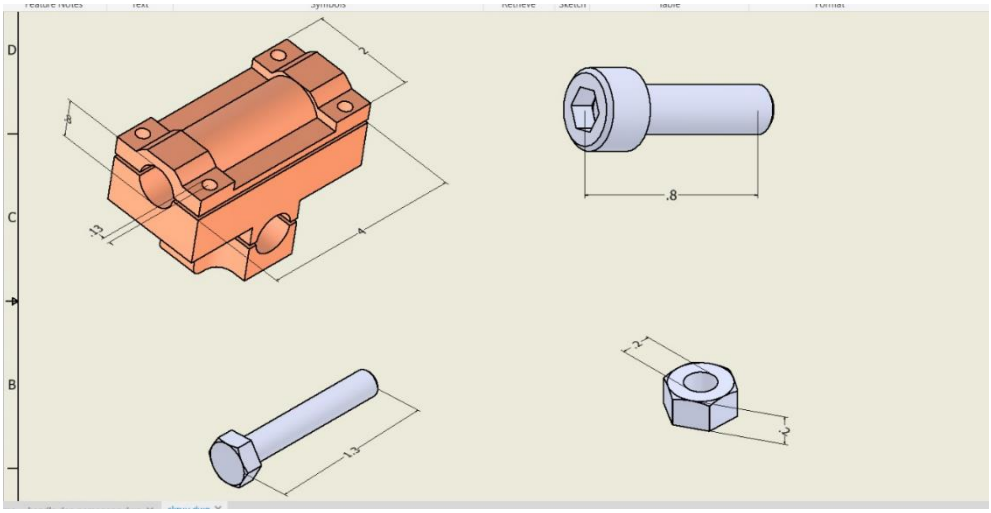



Figure 3.7 Screw and Nut Design

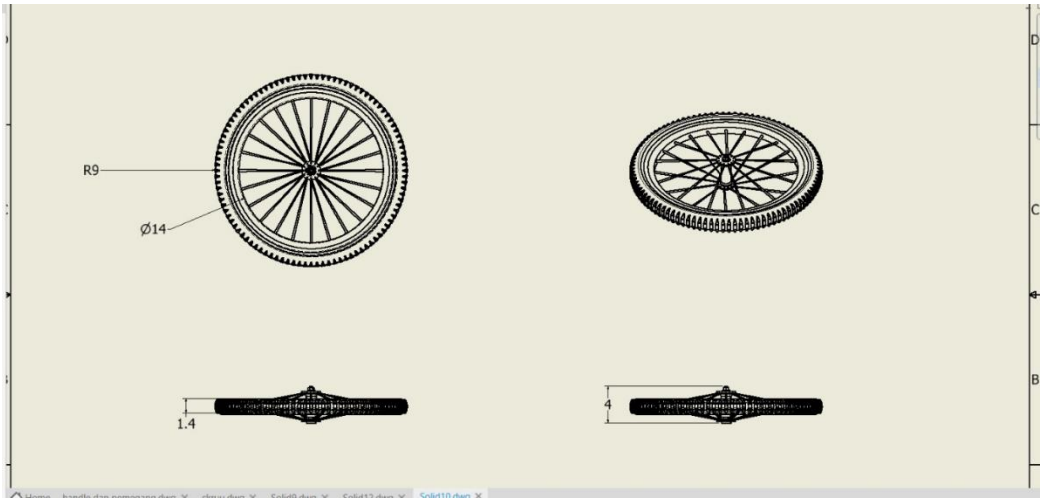



Figure 3.8 Wheel Design

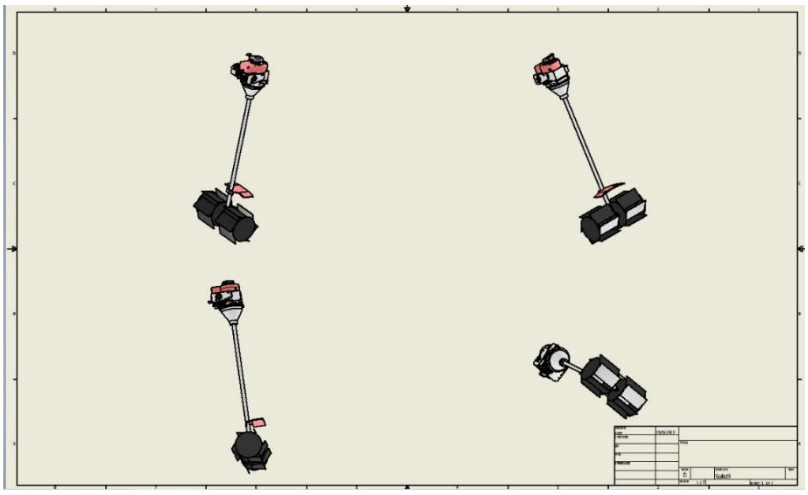


Figure 3.9 Cultivator, Engine Motor, Aluminium Pipe

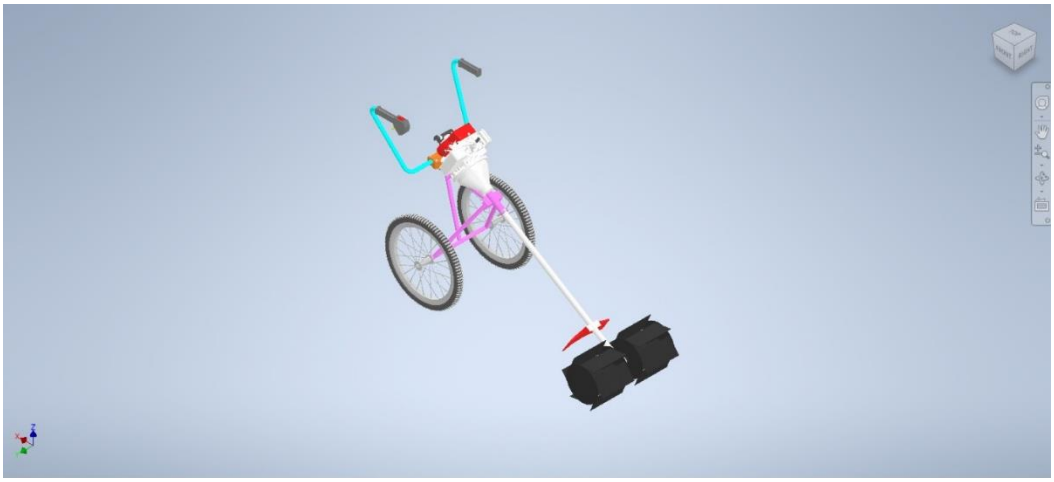


Figure 3.10 Assembly

## 3.9 LIST OF MATERIAL

### CULTIVATOR

An agricultural or gardening instrument called a cultivator is used to loosen and break up soil, get rid of weeds, and get the area ready for planting. It is made to cultivate the top soil layer while causing minimal disturbance to the deeper soil layers.

### ALUMINIUM PIPE

The aluminium pipe is normally fastened to the engine and may also be equipped with mufflers or shafts. To make sure the pipe is firmly fastened and free from blockages or damage that might affect the operation of the wheel hoe, it is crucial to constantly examine and repair it.

### CLUTCH CASE

The wheel hoe's cultivating blades are engaged and disengaged by the clutch mechanism, which is housed in the clutch case. The clutch connects the engine's power to the cultivating blades when it is engaged, enabling them to revolve and carry out the cutting motion. In contrast, when the clutch is released, the power to the blades is cut off, causing them to a stop.

### WHEEL

A wheel hoe wheel allows for simple tool movement. It makes it simple for the operator to push or drag the wheel hoe across the ground while directing it between or along rows of plants. The wheel's smooth motion and reduced friction make moving across the field or garden simpler. The wheel hoe is stabilised and supported by the wheel. It makes it simpler to manage and use by distributing the weight of the tool and the user effort.

## UNDER FRAME BODY

The wheel hoe's major structural support comes from the bottom frame body. To endure the shocks and strains of growing activities, it is often composed of sturdy materials like steel. The bottom frame body offers stability and stiffness, ensuring that all of the wheel hoe's parts are properly fastened and positioned. The under frame body also provides mounting points for the engine.

## MIDDLE HANDLE

The handlebar or grip that is positioned in the middle of the wheel hoe chassis is referred to as the "middle handlebar" on a wheel hoe. A vital part of operating the wheel hoe is the centre handle. It is normally set up at a height that is convenient for the user and makes it simple to grasp and regulate how the wheel hoe moves. The wheel hoe must be turned and navigated using the middle handle.

## UPPER HANDLE

The operator main point of control for moving the wheel hoe is the upper handle. The operator may keep a tight hold on the wheel hoe and direct its movement by firmly grasping the upper handle. For controlling the wheel hoe's direction, use the upper handle. The driver may alter the orientation of the wheels by tilting or moving the handle to one side or the other, enabling accurate and quick steering. This makes it possible for the operator to steer clear of obstructions, perform turns, and mow in specific patterns.

## ENGINE MOTOR

An essential part of a wheel hoe is the engine motor, which supplies the force required to run the cultivate mechanism. The power needed to move the wheel hoe cultivator blades or revolving claws is produced by the engine motor. It commonly burns petrol as fuel, which through combustion transforms the chemical energy contained in the fuel into mechanical energy. The wheel hoe cultivation mechanism is rotated by this mechanical energy, allowing the soil to be worked. They include a gasoline system, spark plug, cylinder, piston, and other parts. A controlled explosion is produced when gasoline and air are combined in the cylinder and ignited by the spark plug. This causes the piston to depress and transforms the expanding gas pressure into rotational motion.

## THROTTLE CONTROL

The wheel hoe throttle control is in charge of regulating the engine speed. The operator may directly alter the engine RPM, which in turn impacts the wheel hoe's speed and power output, by adjusting the throttle control. The throttle control is frequently adjusted to a certain setting, such as the choke or start position, before starting the wheel hoe. In order to start a cold engine, this setting aids in providing the proper fuel mixture. The throttle control is set to the proper operating speed after the engine is running smoothly. Utilising the right throttle control can assist maximise fuel economy.

**SCREW AND NUT**

Wheel hoes need screws and nuts for a variety of tasks, including construction, maintenance, and adjustment. During the construction of a wheel hoe, screws and nuts are frequently employed. They are employed to join various pieces and components, ensuring a safe and robust structure. They might be used, for instance, to join the wheel hoe's handles, wheels, cultivator blades, motor housing, and other structural components.

### 3.9.1 SUMMARY

Based on this methodology, we organize and do projects on a regular basis as there is a Gantt chart to ensure that the assigned tasks are completed within the stipulated period. Also, find out more details about the project through flow charts as well as drawings from CAD to show the product results. Finally, the list of costs we use does not exceed our budget of RM500 and below.

# CHAPTER 4

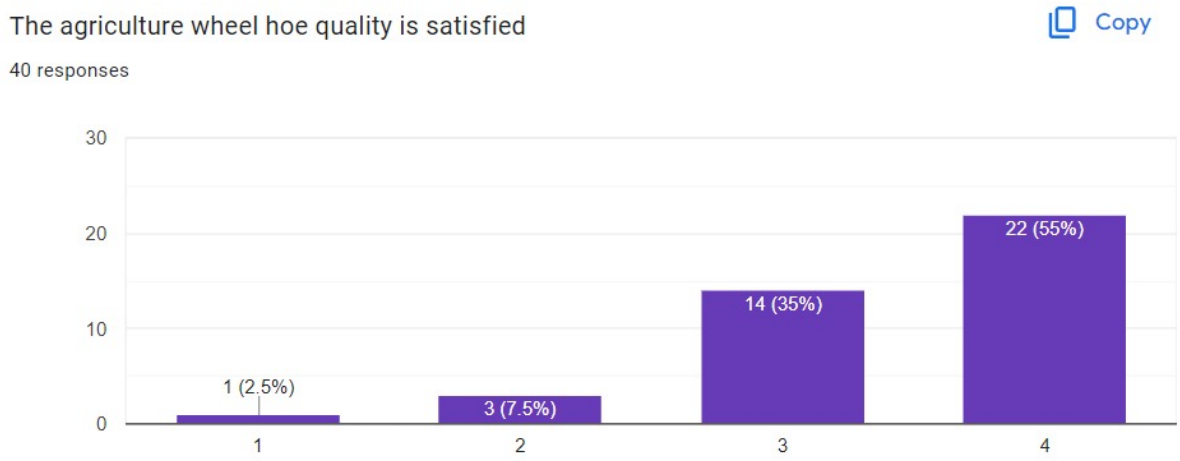
# RESULT AND ANALYSIS DATA

## 4.1 INTRODUCTION

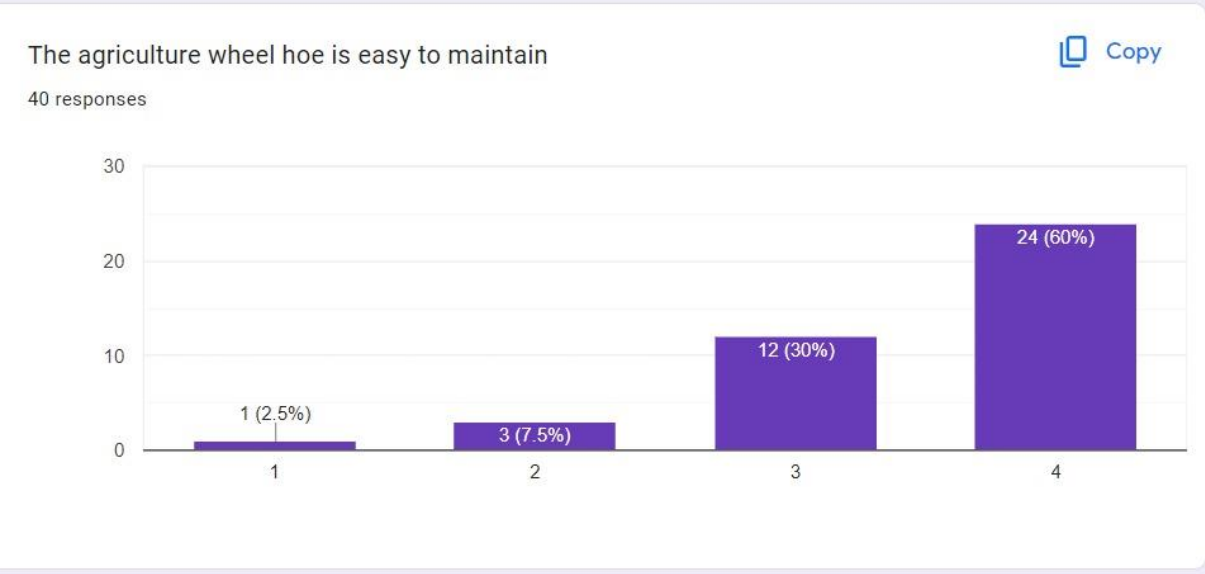
This fourth topic, results and data analysis, describes the statistical data obtained from our research on Agricultural Wheel Hoe in the world. We analyse in terms of function and effectiveness of Agricultural Wheel Hoe when they use our product. Next, we will answer the questions based on the study conducted. Among the questions is did the agricultural wheel hoe quality is satisfied? Did the agricultural wheel is effective for tilling and cultivating? and did the Agricultural Wheel Hoe is recommend for agriculture use ?. In addition, we will show project results based on the research we conducted and in solving the problems we have stated in chapter 1. Then, project testing and performance analysis, where we look at the extent of our product's ability in achieving the set objectives and analyse all weaknesses for further improvement. Finally, we will analyse the output received through calculations to find out the potential energy that can be generated by the Agricultural Wheel Hoe.

## 4.2 DATA ANALYSIS AND STATISTIC

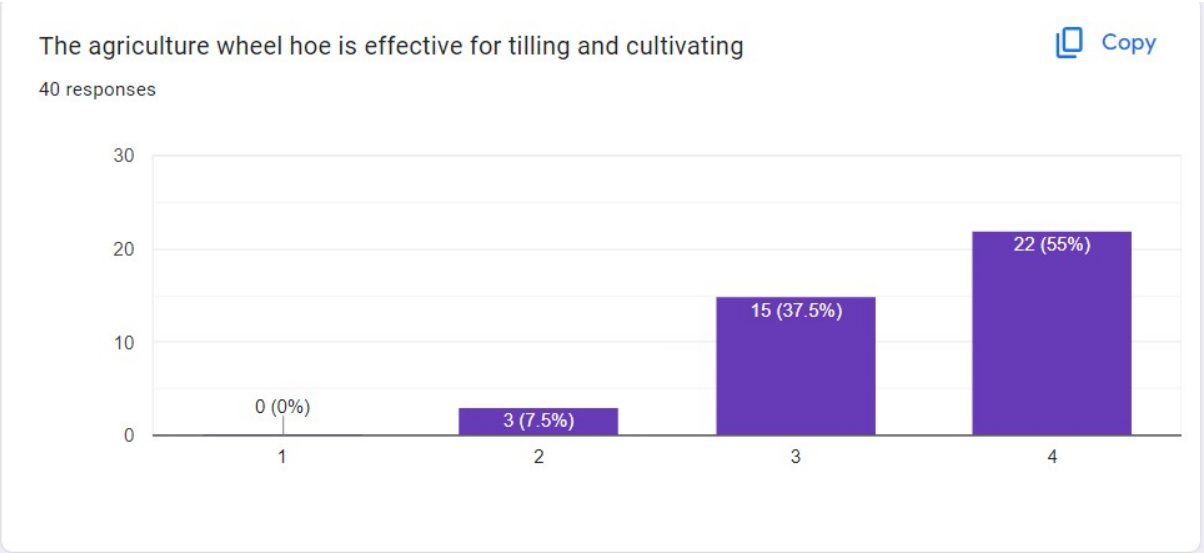
The statistics and data below are what we can get from users through the google form platform to identify the effectiveness of the "Agricultural Wheel Hoe" to all communities.



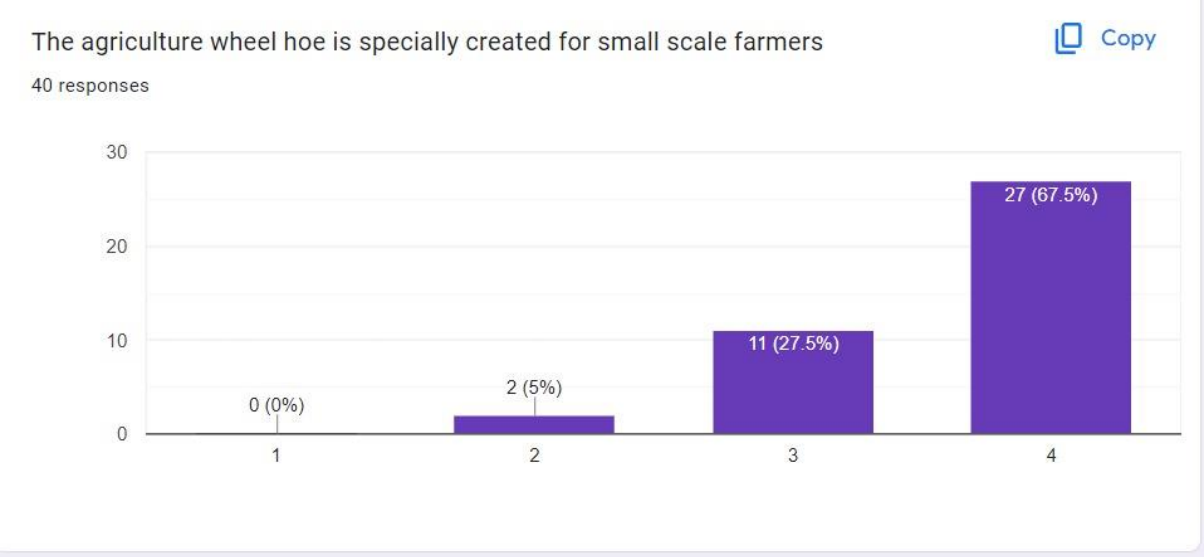

The bar chart above shows that 56% of consumers agree and satisfied with our product which is "Agricultural Wheel Hoe" that can help those famers cultivate the soi easily at their small farm, while only 2.5% disagreed with our product satisfication. It is because our product is noisy and only can use on loosened soil.



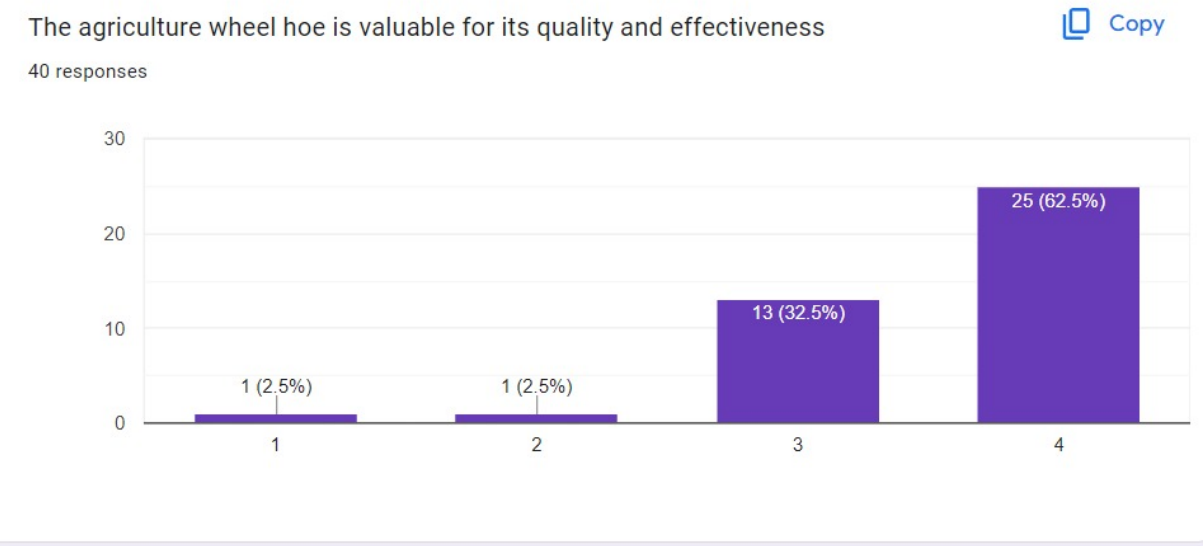

We analyse the data obtained and found 60% of users agree that our product is easy to maintain, while only 2.5% users disagree. Our products is easy to maintain because there are various type of spare part that we can find in machinery shop or hardware, then the fuel consumption is low. Our product also, need to done the maintenance monthly if the farmers use it frequently.



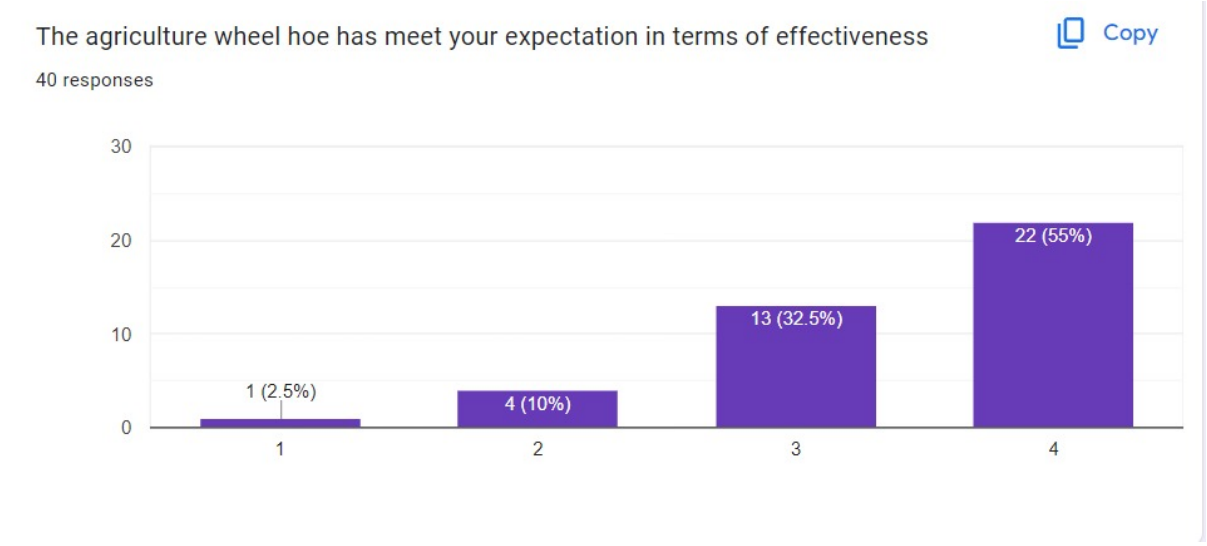

Based on the bar chart above,55% of customers agree that this product is effective in tilling and cultivating soil, while there are 0% vote for disagree. Our products are one of the effective machine to use in agriculture work for small scale farm. This is because many farmers had a problem in cultivating soil manually and use more manpower, so we provide our product which semi auto and use less manpower.



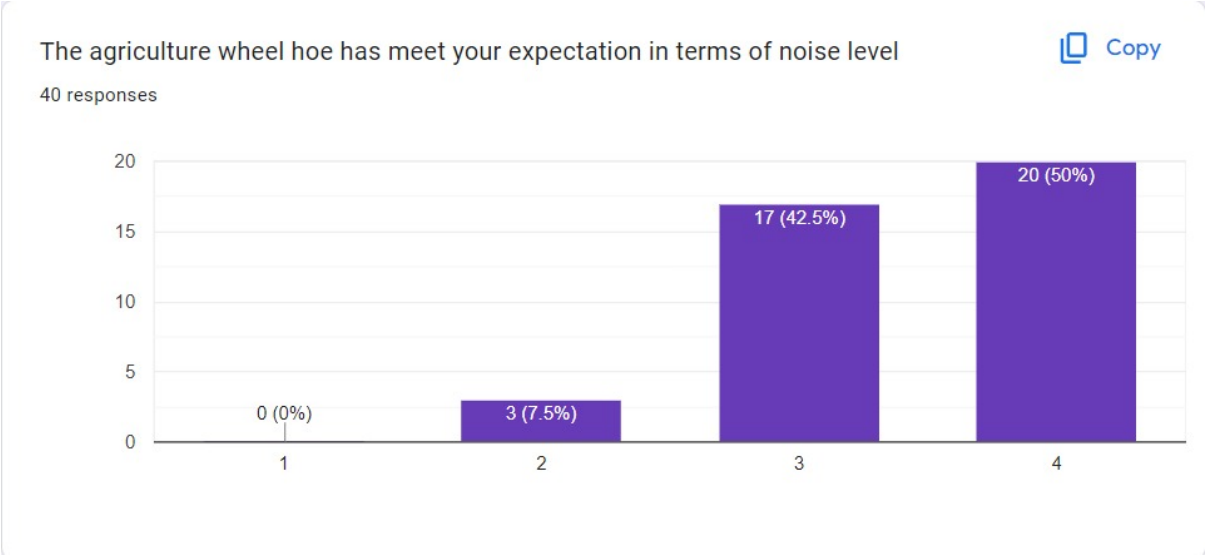

Through the scale given to consumers, there are 67.5% gave a rate of 4 to this product that specially created for small scale farmers. Then there are no data shows that the consumer is disagree with speciality of our product. Agriculture Wheel Hoe is specially created for small scale farmers.



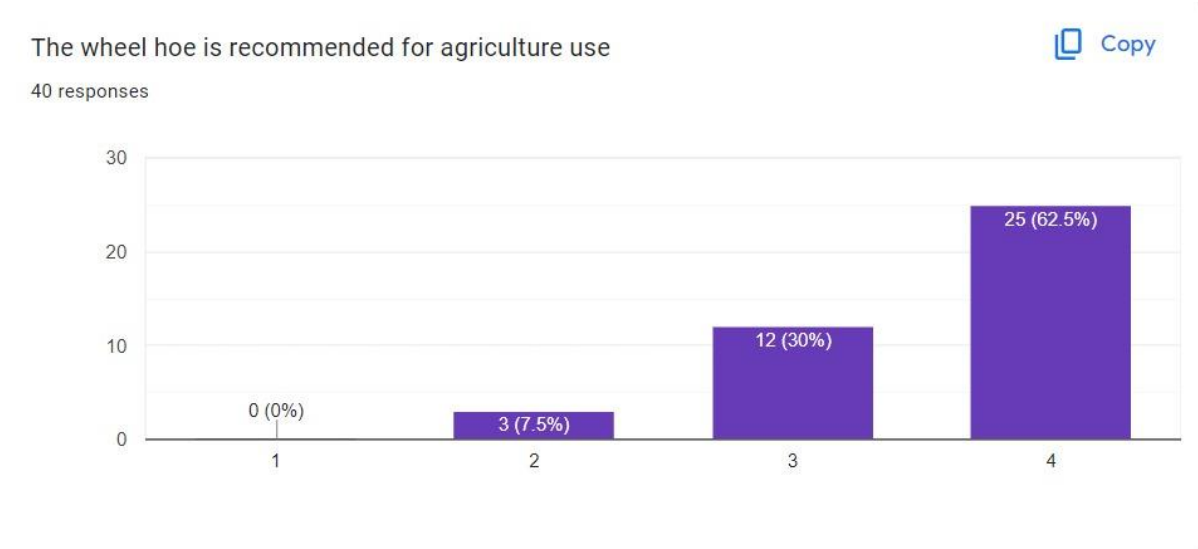

The bar chart above shows that 62.5% of consumers agree with our product that the "Agricultural Wheel Hoe" is valuable for its quality and effectiveness. while only 2.5% disagree. Our product is valuable because the quality of material we use is durable and stiff to use on an uneven surface. Before we proceed, we test our product on an uneven surface and the product is still effective.



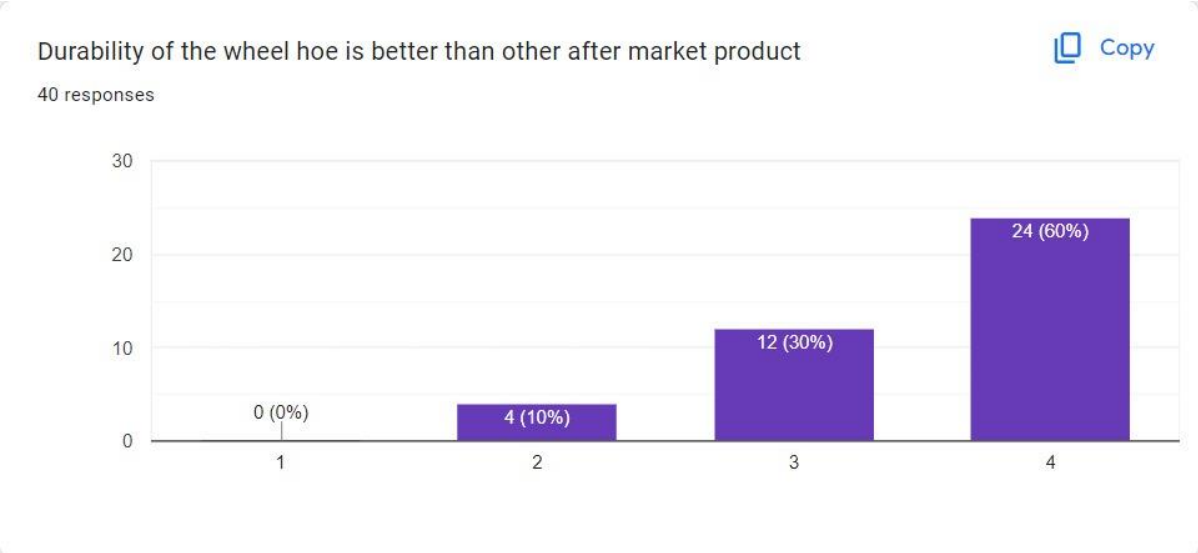

We analyse the data obtained and found 55% of users said the product has meet their expectation in terms of effectiveness, while 2.5% said no. There are 32.5% give a rate 3 and 10% vote for 2. User have their own expectation on our product. Some of the users may not agree with the effectiveness. So, we will take note and improve our product next time.



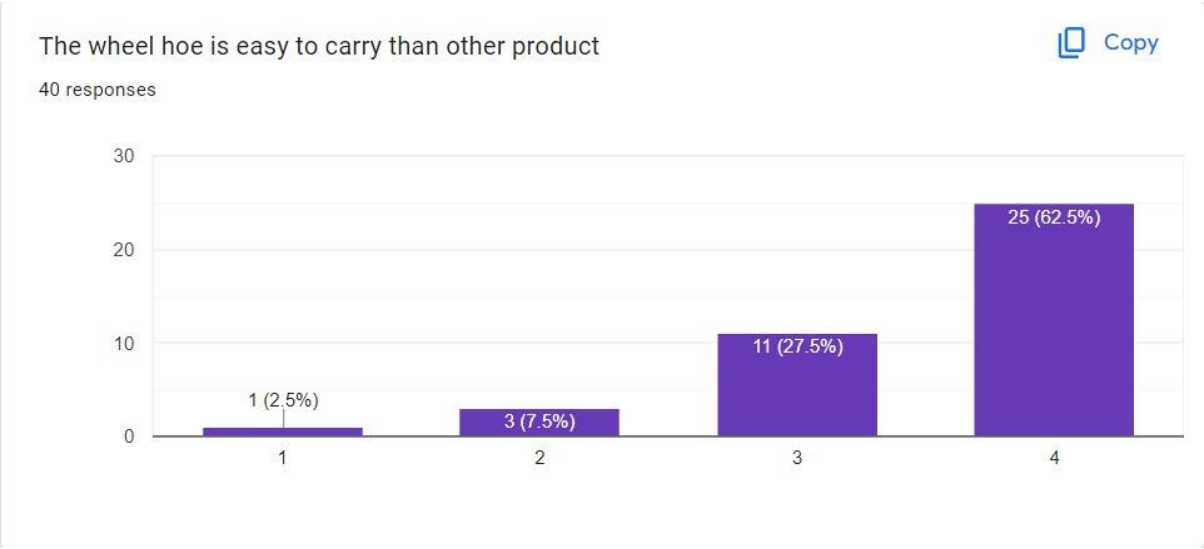

Through the scale given to consumers, there are 50% gave a rate of 4 to this product. Then, no one voted for disagree. It is because our product noise level is totally high and loud. While proceed the product we always think the solution for reducing the noise level but did not found the possible solution. We can advice that the user can use earplug to help them reducing the noise level.



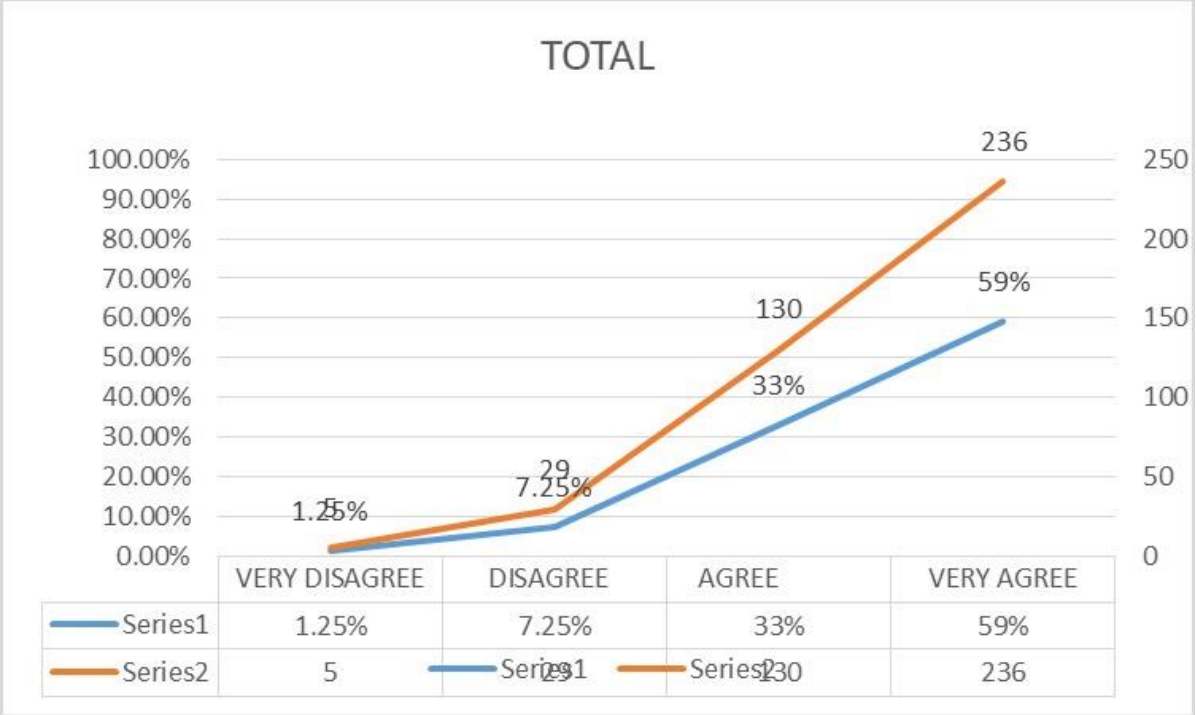

We analyse the data obtained and found 62.5% of users said the product is recommended for agriculture use, while 0% vote disagree. Our product is recommended because the price is affordable, easy to carry, easy to maintain and durable. This product can solve the problem for small scale farmers to make their agricultural work easier.




The bar chart above shows that 60% of consumers agree with our product that the "Mini Tidal Generator" durability is better than other aftermarket product, while there are 0% disagreed. When it comes on durability, we have a discussion before we choose the material for our product and the outcomes is great.




We analyse data obtained and found 62.5% of users said the product was easy to carry, while 2.5% said no. Our products are ideal to carry when doing agricultural work such as tilling and cultivating. It is because, the weight of our product is light. At least only the engine motor is little bit heavy but the body frame still can still support it. So it's not wrong if we say our product is easy to carry than the other agricultural machine.




Through the scale given to consumers, a total of 236 people and 59% vote for very agree to this product. Then followed by 130 people, 33% vote for agree. Then, a total of 29 people and 7.25% vote for disagree. Besides, there are a total of 5 people and 1.25% vote for very disagree. Finally, the line chart above shows the total of 400 response data based on the question given in the google form.

## 4.3 DESCRIPTION OF FINAL DESIGN SOLUTION

Based on the inspection we conducted. There are many ways to enhance our product, the agricultural wheel hoe. Power and efficiency come first. Improve the engine motor to deliver enough force and power for efficient farming. This can entail using a more potent engine or enhancing the performance of the current engine. To extend working life and reduce environmental effect, efficient fuel or energy use should also be a top goal.

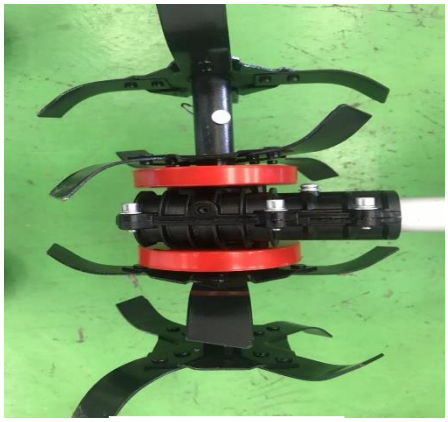
Second, user comfort and ergonomics. In order to assure user comfort while operating, ergonomics must be the main focus. This may be done by creating adjustable handlebars that have a pleasant grip and can adapt to varied user heights. To lessen operator fatigue and discomfort caused by vibration, cushioning or vibration-damping materials might be included

Then, the reduction of emissions and noise. To design a machine that is more user- and environmentally-friendly, we also need to concentrate on noise reduction and emission control strategies. In order to lessen noise and exhaust emissions, this may entail the use of noise-dampening materials, mufflers, or catalytic converters.

Lastly, Mobility and stability come last. Optimisation of the wheel size, tread design, and alignment will increase the agricultural wheel hoe's mobility and stability. This would enable effortless mobility over diverse terrains and improved operational control.

In conclusion, Continuous feedback from users and ongoing research and development efforts can further drive improvements in the design of our agricultural wheel hoe, leading to a more efficient, user-friendly, and reliable gardening tool.

## 4.4 PROJECT FEATURES SPECIFICATION

| | |
|---|---|
|  <br>Engine Motor | • Model STP452-1<br>• Engine Speed 9000 r/min<br>• Maximum Output 1.25 / 6500rpm<br>• Carburetor Diaphragm type<br>• Ignition Transistor Magnet<br>• Fuel Used Gasoline<br>• Fuel Tank Capacity 1.0 |
|  <br>Wheel | • Material Used Plastic and Rubber<br>• Diameter 7-8 Inches |
|  <br>Cultivator | • Six Claw Type<br>• Material Used Steel<br>• Shaft Type 9T |

| | |
|---|---|
|  <br>Handle Bar | • Material Used Steel<br>• Type Of Handle Double Grip<br>• Use Screw And Nut |
|  <br>Screw And Nut | • Material Used Steel And Plastic<br>• Diameter 0.5 Inches<br>• Toughened Steel |
|  <br>Furrower | • Material Used Steel<br>• Sharp<br>• Lightweight |

Table 4.1

## 4.5 NOVELTY AND INVENTIVENESS

Our engine-powered agricultural wheel hoe can be viewed as a fresh innovation and creative departure from conventional hand-operated wheel hoes. Despite the fact that manual wheel hoes have been used for decades to help with agricultural and gardening chores, the inclusion of an engine motor adds a new level of comfort, effectiveness, and usability.

The addition of an engine motor to the wheel hoe construction is innovative. The hoeing procedure may be automated thanks to its motorization, requiring the operator to exert less physical effort. Work like weeding, cultivating, and breaking up the soil is made faster and easier by using an engine motor to power the wheel hoe.

A wheel hoe with an engine motor is ingenious because it combines two established technologies the engine motor and the wheel hoe in a fresh and creative way. The invention overcomes the drawbacks of human labour while maintaining the essential functionality and mobility of the original tool by modifying the conventional hand-operated wheel hoe to include an engine motor.

## 4.6 IMPACT AND APPLICATION OF THE PROJECT

Our agricultural wheel hoe provides the consumer with a number of advantages that improve their gardening or farming experience. First, usability. The wheel hoe is significantly simpler to manoeuvre since the engine motor eliminates the need for physical pushing or pulling. This lessens the physical effort required and opens it up to a larger spectrum of people, including those with restricted strength or mobility.

Time savings is the second. When compared to manual wheel hoes, the wheel hoe with motorised operation can cover more areas in less time. This allows the consumer to achieve more in their agricultural or gardening duties by saving them significant time and energy. Increased Efficiency follows. The agricultural wheel hoe works more rapidly and reliably to prepare the soil by tilling, cultivating, and other methods. It guarantees that the task is completed effectively, resulting in increased productivity and better final outcomes.

Next, control and precision. The client may choose the hoeing depth and intensity by adjusting the speed settings on our agricultural wheel hoe. This accuracy and control assist safeguard fragile plants from inadvertent injury and guarantee precise and effective farming or gardening techniques.

Finally, better user experience. Farming or gardening may be made more pleasurable and less physically taxing by using our agricultural wheel hoe. The customer's effort is minimised, allowing them to devote more time to other elements of their farm or garden, making the experience more rewarding.

In general, agricultural wheel hoe provides clients involved in farming or gardening operations with convenience, time savings, better efficiency, precision, and an improved user experience.

## 4.7 PORJECT OUTCOME

Side View

Front View

Top View

Figure 4.1

## 4.8 PROJECT TESTING AND PERFORMANCE ANALYSIS

| **First attempt** | |
|---|---|
| Fuel Consumption | **Full** |
| Cultivator rotation | **Moderate** |
| The Power Generated | **Low** |
| Distance Travelled | **50 metre** |
| | |
| **Second attempt** | |
| Fuel Consumption | **Half** |
| Cultivator rotation | **High** |
| The Power Generated | **Moderate** |
| Distance Travelled | **70 metre** |
| | |
| **Third attempt** | |
| Fuel Consumption | **Empty** |
| Cultivator rotation | **High** |
| The Power Generated | **High** |
| Distance Travelled | **100 metre** |
| | |

Table 4.2

### 4.8.1 ANALYSIS

Based on the project test analysis made by our group, we have identified several problems. On the first try, we found that our agricultural wheel hoe have a problem while starting engine. The engine may not start due to a variety of reasons, such as a drained battery or a clogged fuel line or spark plug. So, we have taken a solution to check the fuel level, clean and replace the spark plug if necessary, and ensure the ignition switch is in the proper position. We also follow the manufacturer instructions for starting the engine. Then, we start testing our project and we found out the fuel con Sumption is still full, cultivator rotation is moderate when rpm 3800 and distance travelled is 50 metre.

Next, on the second attempt, we found out an excessive vibration on our project. Excessive vibration or noise can indicate an issue with the engine or the tool itself. Loose bolts, worn-out components, or engine misalignment could be the cause. Then, we try to solve the problem by inspect and tighten all bolts and fasteners. Examine the engine mountings for proper alignment and adjust as needed. Then, we start to run again our project and the performance analysis shows fuel consumption is half. We try to use high rpm which is 4700 rpm and the cultivator is rotating better than first attempt.

On our third attempt, finally all problems were solved. We also check if engine motor have any leaks. Next, the fuel consumption is running to empty because we let the engine run into high rpm which is 5300 rpm and try the engine motor maximum power. We found out that the cultivation is rotating highly than attempt before. The total distance travelled by our project during testing and cultivate soil is 100 metre. Based on the results and analysis there are still many shortcomings in terms of fuel consumption and engine torque that need to be improve. Lastly, we also decide to improve the design of our project to be more attractive for user.

## 4.9 DISCUSSION

In preparing this project report we have done all the tasks by planning and also we have discussed a lot with our supervisor to do this report. From starting week 1 and week 14 we have struggled a lot and we faced many challenges to complete this report. Even Though some problems were faced such as in the first few weeks we lacked ideas on our project making. So I have done a lot of research on google and look through all previous project 1 assessments and also model build up so far. So after we gaining enough knowledge on how to come up with an idea, then we begin to work on the project making in the workshop after the designing which was done previously on project 1.

Besides that, we do have problems on the usage of workshop machines as some of they were new to us in terms of practical usage. Such as grinding machine, table saw and welding machine. This also affects the time we need to learn the right machine usage and how we can adapt it to our project. Also there were some minor injuries that happened too as we wrongly operated the grinding machine. Not only that, even at first few weeks of workshop works, we cut the steel with wrong dimensions.

Moreover, there were also some other minor problems such as lack of knowledge in material selection where we selected the wrong types of steel at first which we later overcame but somehow that cost us a lot of time, energy and money usage. Also stress of making minor mistakes also usually be felt among the team. With also less effective decision of the leader in terms of idea of project making also cost much time to making a turn back to a whole some team discussed idea together which eventually made the project better now with the whole team supposed. We also faced a problem in the middle of the week in writing project 2 report.

With all of these challenges as problems, we still step up to overcome these challenges and cooperate with our supervisor. We are able to complete this full report. Checks and opinions are made from our supervisor so that we can improve in more upcoming project making in this revolutionary industrial world.

# CHAPTER 5

# CONCLUSION

## 5.1 INTRODUCTION

In this chapter, we will describe the achievement of goals and objectives of the study "Agricultural Wheel Hoe" and then suggestions and recommendations from us to further improve the efficiency of this product in order to attract many consumers to try it.

## 5.2 ACHIEVEMENT OF AIMS AND OBJECTIVE OF RESEARCH

With all the research and information gathering now we can conclude that the goal and the objectives presented at the beginning of the research were successfully achieved. Purpose from the creation of this Agricultural Wheel Hoe has shown satisfactory performance in small scale farmers agriculture. At the same time it has also achieved the objective of fabricate and test the agricultural wheel hoe to use in agriculture work. Then, we also succeed to provide an effective tool for gardeners and farmers to maintain healthy and productive gardens. The review of the study has been achieve throughout project implementation and this includes the resulting to design a wheel hoe for use in tilling and cultivating in single equipment using 3D Inventor Software. However, what is very important in the production of this Agricultural Wheel Hoe is that we can study the function and provide experience in the production of this project.

## 5.3 SUGGESTIONS AND RECOMMENDATIONS

With the completion of the fabrication of our project, we have made the Agricultural Wheel Hoe project as accurate as possible as we expected. Even with that, there are some limitations that we can meet to make our Agricultural Wheel Hoe more compatible with today's technology.

Employ a wheel hoe frame and engine motor that are long-lasting, composed of high-quality materials. Think about respected manufacturers that are known for creating dependable and long-lasting gardening tools. Next, assess the engine motor's performance and power capability. To guarantee it suits your gardening demands, take into account elements like engine horsepower, torque, and RPM (revolutions per minute). Look for a motor that has the power to do the activities you want to complete, such as cultivating difficult soil or clearing huge areas.

Moreover, improvements in terms of fans and better motors that can withstand higher water pressure and current. In addition, it also improves the quality of the design and other component materials. These changes can also attract public interest and produce durable and long -lasting electricity generation. We hope this project can also be developed in Malaysia to help them to get free electricity and not use the opportunities available

## 5.4 CONCLUSION

In conclusion, small-scale farmers may profit greatly from the Agricultural Wheel Hoe. The use of this product by small-scale farmers is strongly recommended. Operating our Agricultural Wheel Hoe requires only a small amount of physical work. Along with boosting productivity, our team also emphasises mobility. As you can see, our generator is designed to be more useful for small-scale farmers while also promoting sustainable practises. It is also composed of strong, lightweight materials. Due to these advantages, it is a useful tool for small-scale farmers who may use it to simplify their processes, increase output, and enhance farm management as a whole.

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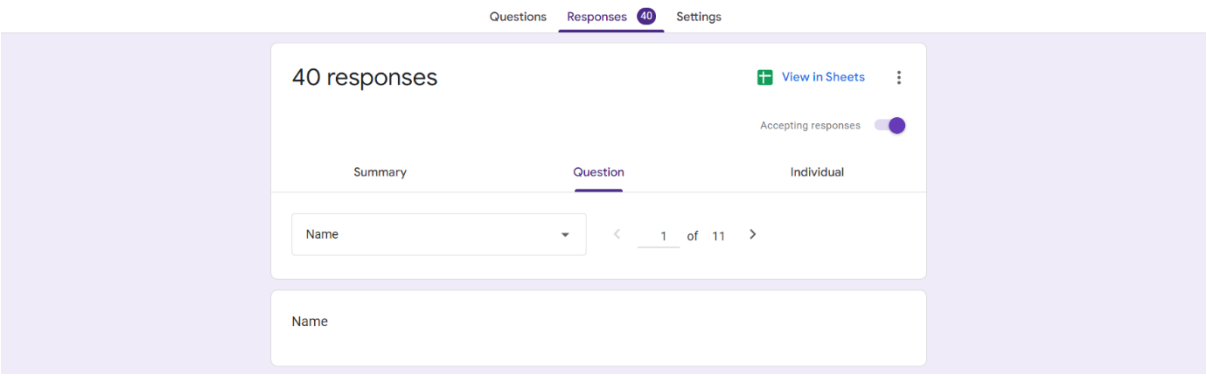
# APPENDICES

APPENDIX 1 Questionnaire Form

APPENDIX 2 List Of Respondent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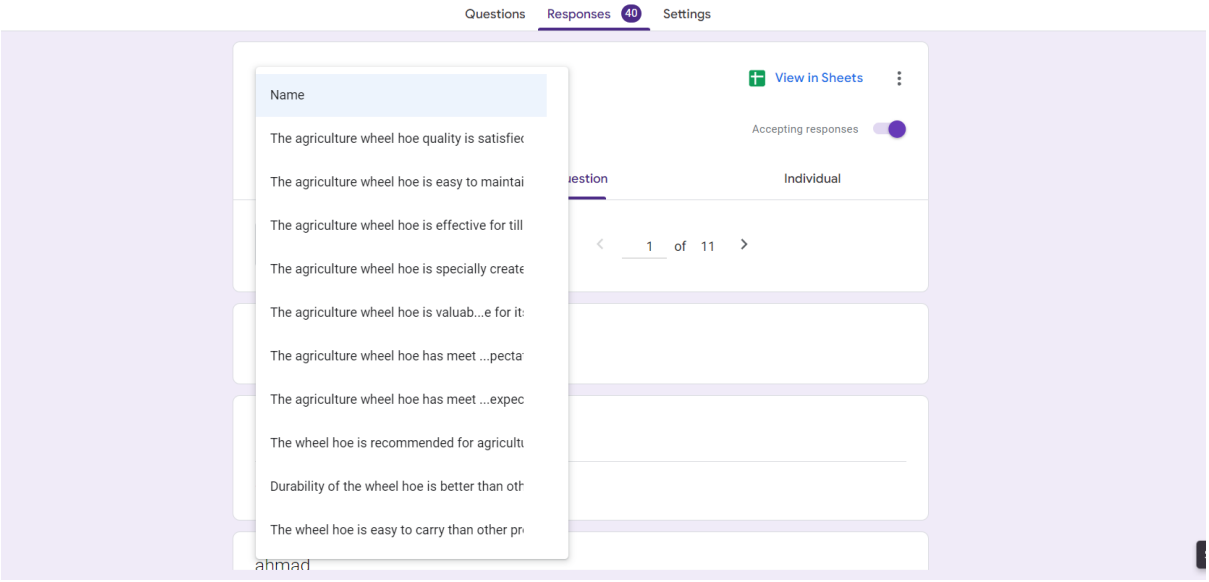
Responses 40
Settings
40 responses
View in Sheets
Accepting responses
Summary
Question
Individual
Name
1 of 11
Name


Questions
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1 of 11
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Durability of the wheel hoe is better than oth
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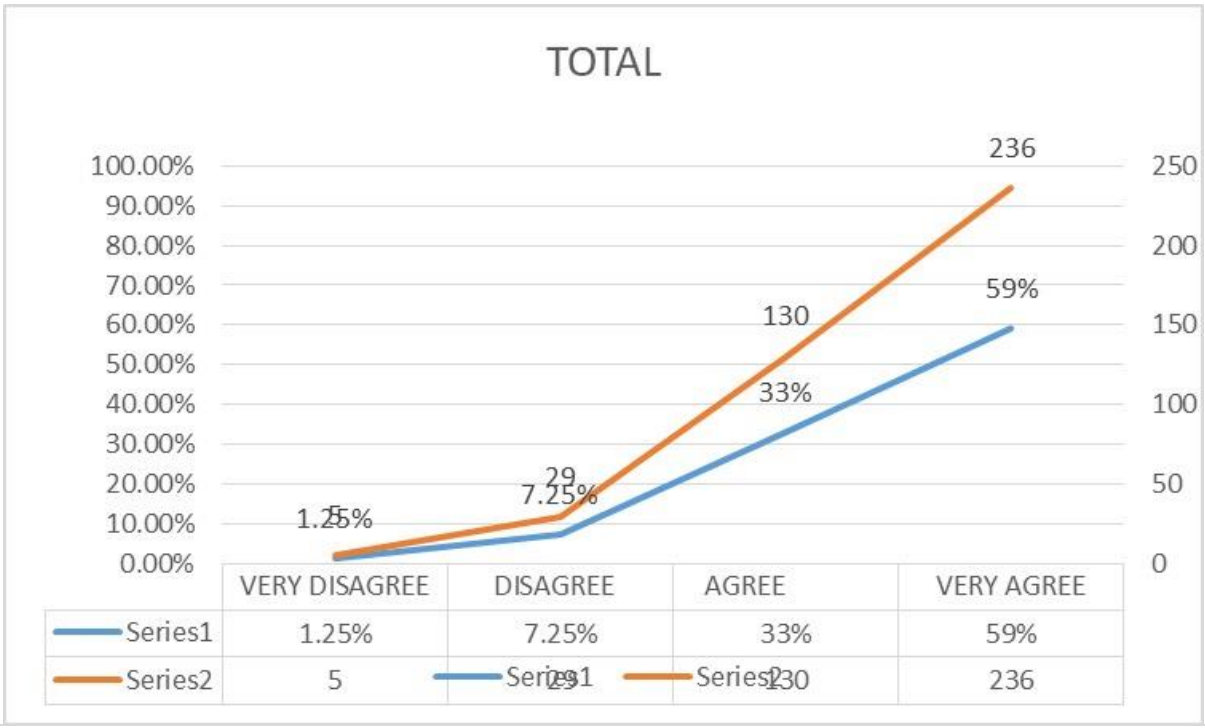
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90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
250
200
150
100
50
0
236
130
59%
33%
29
7.25%
5
1.25%
VERY DISAGREE
DISAGREE
AGREE
VERY AGREE
Series1
1.25%
7.25%
33%
59%
Series2
5
29
130
236
Series1
Series2