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POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

BLACK PEPPER SEPARATOR MACHINE

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DECLARATION OF ORIGINAL WORK AND INTELLECTUAL PROPERTIES

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Thank you.

Disediakan oleh:

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ABSTRACT

Peppercorns are used throughout the world especially in the food industry. They also has medicine benefits. However, two types of peppers preferred by cooks and chefs are the black pepper and white pepper variety. It has been noted there has been a decrease in new technology for the black pepper industry. The lack of technology development subsequently affects the local farmers working on black pepper plantation. The main purpose of this project is to design and develop peppercorn sifter machine to more modern and innovative. The design concept integrates a wheel separator to roll the seeds out from the stem. Fabrication process begins with selection of materials and proper fittings. The machine is made from high-quality plywood to withstand a vast amount of weight and the wheel. It is operated by 1400 RPM motor. Finishing and additional adjustments were conducted after through testing on the prototype. It has been testified that the machine was perfectly able to contain a maximum weight at 100 kg of pepper corn. Future suggestions include replacing the wood body of the machine with other material like steel.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

The idea were fully generated by the old version of Black Pepper Sifter machine which is used by local people especially in Sarawak to separate the black pepper's seed from it's stalks

1.2 Research Background

Pepper is a generic and typical type of ingredient which can be used for cooking in daily life. It may very well be the single most popular herb not only in America but as well in Asia and South East Asia specifically. There are two types of peppers that particularly which is black pepper and white pepper which being used by cooker or chefs. In addition, it is the most useful ingredient in the world which include the household and the industry such as food and beverage industry.

Malaysia is well known for the main pepper exporter in the world. It is because of the soil type and the humid temperature which allow the pepper to grow healthy and produce the high quality pepper. This cause the Malaysia pepper having a high demand from all over the world.

Malaysia government supporting the local planter and entrepreneur in plantation sector such giving a subsidiary and equipment. The entrepreneur is given a low interest for their loan and provision to start a business for pepper distributing,

These local entrepreneur will need to improve favourable economic circumstances in the plantation industries by advancing in the process in sifting the peppercorn. This is where the engineers step in with their own distinctive style of innovations of the existing merchandise and enhancing it by improving its conveniences for the consumer with engineering philosophies. The supply and demand is one of the factor where all the innovation and inventions happen in the first place.

In further thorough of this research by implementing the engineering philosophies and innovation will make the process for peppercorn sifting will much easier especially for the local farmer and entrepreneur in Malaysia and all around the world with this innovation.

1.3 Problem Statement

The existing machine that was provided by the Malaysia government is a fully manual machine and quite difficult to handle. It also cost a long time to distribute a certain amount of peppercorn. Without having a modern technology on the peppercorn sifter machine in the previous, it takes about three days to reach 10kg of peppercorn. The traditional ways for sifting the peppercorn uses a lot of manpower.

1.4 Research Gap

The aim of the research is to provide a convenient way for the entrepreneur and the local planter to increase their productivity. The traditional machine is using man power to operate and took a lot of time in term of productivity. The modern machine that is being develop is using electric motor which will ease the pepper planter to produce a lot more products.

1.5 Research Objectives

a. To design and develop the peppercorn sifting machine.
b. To make it portable and ease to move around which suitable for the industries and pepper planter
c. To fabricate a peppercorn sifting machine.

1.6 Significance of study

By inventing a new version of the black pepper's sifter machine is enough to upgrade a new lifestyles towards local agriculturalist regarding to how economies flow in Malaysia.

1.7 Scope and limitations

There are several scopes has been identified and will be used to complete the analytical research in Sarawak which is the main distributor of pepper in Malaysia. The scopes are:
Small and Medium Industries(SME) which involve in pepper plantation and product.

1.8 Conclusion

Nowadays, the issue of vast amount time consuming in separating the black peppercorn led the planter originally moved to work on other agriculturing sector . Overall in this chapter such as the background of the study, statement of problems, objectives of the study, scope of the study and the importance of the study has been discussed the issue among traditional black pepper sifter users, especially the elderly in order to facilitate and prevent consuming a lot of times producing it.

Prepared by:

JOHANNES JARRET JIRAM ANAK KUMPING

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The invention of black pepper treading machine has vary of theory of where it was originated. [1]One of the theory came and written by Westpal,E.Jansen,P.C.M (1989), an inventor who ran to the fanciful and humorous. His version of discovery of black pepper treading machine was found in late 1980.It is believed to be a main project to increase the world's income.

Black pepper and white pepper are the two main dried commodities growers prepare from the fruits of P.nigium. The use of the dried product as a food flavouring was already known in classical Rome and Europe was an important importer of pepper as early as the 12th Century. About 80% of the pepper consumption is jow concentrated in the industrially developed countries, where it is mainly used for domestic culinary purposes and for food flavouring and preserving processed foods. There is a remarkable lack of tradition in the consumption of both types of pepper in Indonesia, Malaysia and adjacent countries of South-East Asia. In recent decades, its classic use as a spice in food flavouring and preservation has increased gradually in these countries because of expanding tourism and industrial development.

In India and Sri Lanka, domestic consumption for food flavouring is common tradition. Pepper oil and pepper oleoresin, extractable from peppercorns, are mainly used in the production of convenience foods.

2.2 Theory/Concept

According to the significance study, the concept was apply to re-worked and old version black pepper's sifter machine which will be able to produce more quantity in a single spin. This invention has taking both of us to another level of reproducing. By the way, the old version of black pepper's sifter machine were using 100% of human sources which make them to exhausted and won't be able to produce more of its. This cause lots of local agriculturalist to give up on this product.

2.3 Existing concepts

The main idea of this product came out from the corn starch sifter machine which will be shown below. Those brilliant idea of my teammates led us to re-worked the old version. A corn starch sifter machines acquired a roller to separate debris from this product. Currently, China is the biggest exporter of the world which led them to produce a machine to separating the corn starch.

A machine which used to sift the corn starch fresh from farm and converting it into a flour

Figure 2.1 Shows a Corn starch Sifter Machine

Clam Separating machine were used by India's community to cleanse the clam from any dirt

Figure 2.1 Shows a Clam Separating Machine

2.4 Type Of Black Pepper Separator

Black Pepper Separator have long been invented and used from time to time and even updated to meet current needs. Currently available in the market are as follows:

2.4.1 Maize Threshing Machine

The machine were originate from China's Agriculture equipment supply. It consume a lot of budget from the local farmer.

There is a purchasing the threshing machine . The user has to lift the machine every time the intend to used it, with such weight, it wasn't possible for the farmer to relocate the machine as it is not portable.

Material that being used in this machine is plastic or steel fill type. This machine is using electric power sources. This machine also use plastic or hollow steel frame. The capacity for this machine is 200 kg/hour. The drive type of this machine is using Vee Belt.

Figure 2.2 Shows Medium Size Black Pepper Sifter

2.4.2 Industry Type Thresher

These thresher make it easy for users in process to reduce time usage with minimal human consumption. One of the shortcomings or problems they face is that they are located overseas. As with most of black pepper sifter available in Malaysia too, consumers have to use a lot of energy to lift loads to put in a container.

Next, it can be expensive for those who want to own it as well as the extra cost of importing goods from abroad. It's also not a kind of eco-green. In addition, damage to this type of cart will make it difficult to repair without someone specializing in it and the cost of repairs should also be considerably more expensive.

Figure 2.3 Shows Motor Type Thresher

2.5 Black Pepper Separator System

Black Pepper separator machine or a thresher is a piece of farm equipment that threshes grain, that is, it removes the seeds from the stalks and husks. It does so by beating the plant to make the seeds fall out.

2.5.1 Process

Because Black Pepper Separator Machine exist in a variety of forms, made from many different materials, manufacturing procedures vary widely depending on the exact kind of Separator Machine being made. Some wooden Separator Machine are simple enough to be made with hand tools used by weekend hobbyists with modest carpentry skills. In order to discuss several different techniques used for making Black Pepper Separator Machine, the following outline will describe the manufacturing of a unique Black Pepper Separator Machine, with wooden handles, rotor mechanism, Vee Belt, and a wooden tray.

2.7 Conclusions

Overall obtained from this chapter is the experiments that will be made referring to the sources of previous studies to complete the work done. In addition, some information from previous wheelbarrows with modern ones has been identified. This implementation can help the use of that are more comfortable, easy to use and prevent injuries.

Disediakan oleh:

JOHANNES JARRET JIRAM ANAK KUMPING

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Methodology can be the analysis of the principles of methods, rules, and postulates employed by a discipline or a particular procedure or set of procedures.

The process started with finding the problem statement of the existing product. After that the best design will be chosen only can proceeds to the selection of materials. The fabrication process comprises of cutting parts for the plain plywood and screwing all the parts needed. After cutting and screwing all the parts, the plain plywood is assembled according to the specification dimension. Finishing is added accordingly. The finished prototype is then tested and adjustments are administered as needed. Only then the end product is deemed suitable to use. Figure 3 shows the flow chart for the methodology.

3.2 FLOWCHART

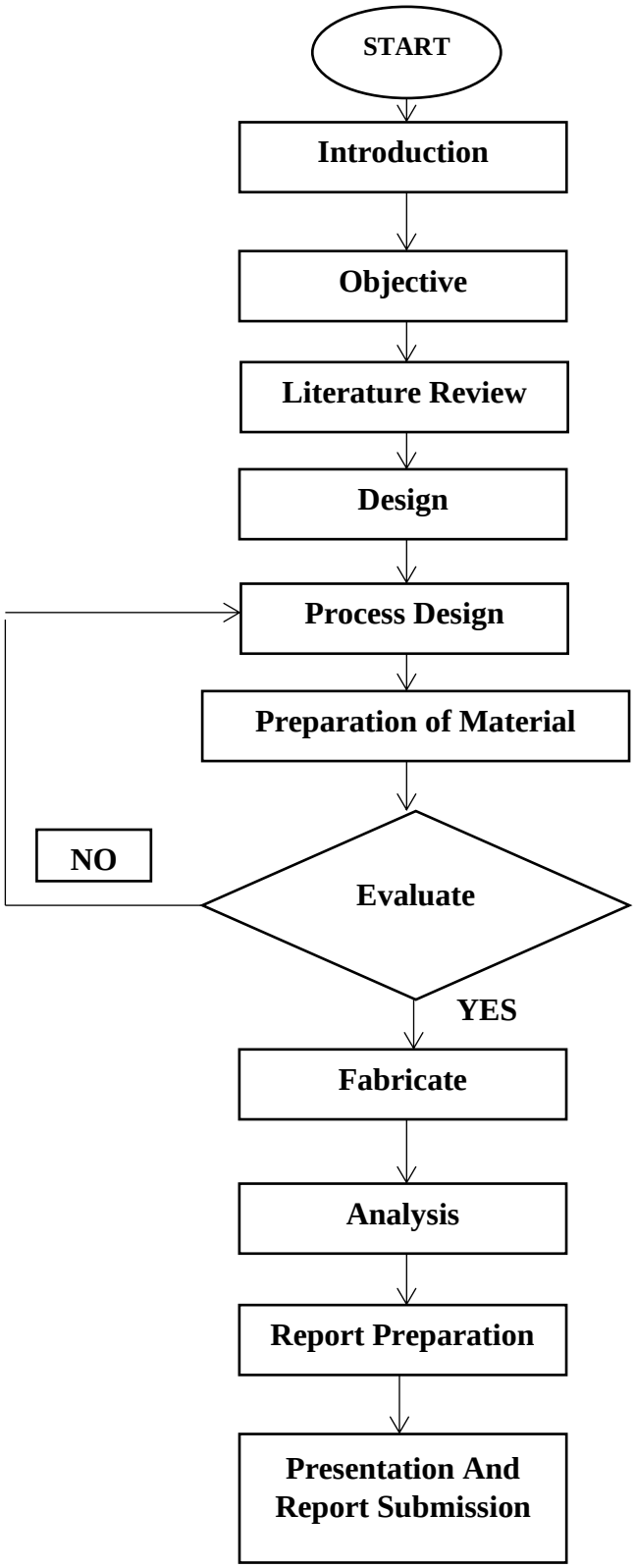


Figure 3.1: Project Flow Chart

3.3 IDENTIFYING PROBLEM

Black Pepper separator machine is an improvement of traditional Malaysian manual treading machine . The black pepper treading machine has lots of additional features which are efficient and improve the quality of life in aspect of human ergonomic movements. The black pepper's roller is a complete 360˚ rotation. The reason behind the rotation is to ensured the fruits are separated from its stem. Hence, this will save more times as it will treading around 1kg black pepper fruits per every 15 minutes simultaneously.

As a matter of fact, there is a hole where the harvested fruits flow downwards to the box. The box can be opened like a drawer to take the black pepper fruits. This is more convenient as the user won't have to separating the stems from the fruits. The user just need to collect the fruits as the fruits will automatically fall down into the black pepper fruit's container via gravity force.

In addition of the features, the treading machine set has been added on with tyres for it can be moved around easily. The product is actually as lightweight as possible it can be made since this is a portable product to be easily carry around. The materials chosen are mostly a light wood and durable from rotting. The treading machine body will be fully made from high quality wood whilst the box under will be made from plastic or metal. The purpose is to reduces the usage of metal which could guarantee the buyers or the users a long-lasting product

The motor will be used to move the roller directly at the end of the shaft where it will be connected to lower pulley as the roller screwed tightly on it and will rotate simultaneously into a parallel movement. The mechanism will make the roller rotate automatically. The power source is from the plug and it transmit energy to the motor to create a kinetic energy which rotates or whirl the roller.

3.4 ANALYSIS

Black pepper separator machine has been through our trial according to the specific test. The test imposed on the black pepper separator machine is using 10kg of black pepper to separate from it's stems same goes to the traditional separator machine which has followed the specified specifications. That is to say, it is safe to use by any user. The existing black pepper separator machine only could only produce 1kg of black pepper to separate in 1 hours. With the new design user can produce a lot more product by using the machine. This will make the black pepper productivity increase from 2 hours to produce 1 kg of black pepper to only 30 minutes. The new design of black pepper separator machine is mounted with electric motor. Hence, it will create more faster rotation on the separator and can easily separate the pepper from the stem.

3.5 Design

The new black pepper separator machine is design by using an electric motor and battery to the machine. The rotator which is operated manually on the existing machine will be connected using drive belt that connected to the electric motor. The battery is for power reserve in case the machine will be move to the different places without power sources. The design can easily withstand the weight of 30kg of black pepper.

3.5.1 Design 1

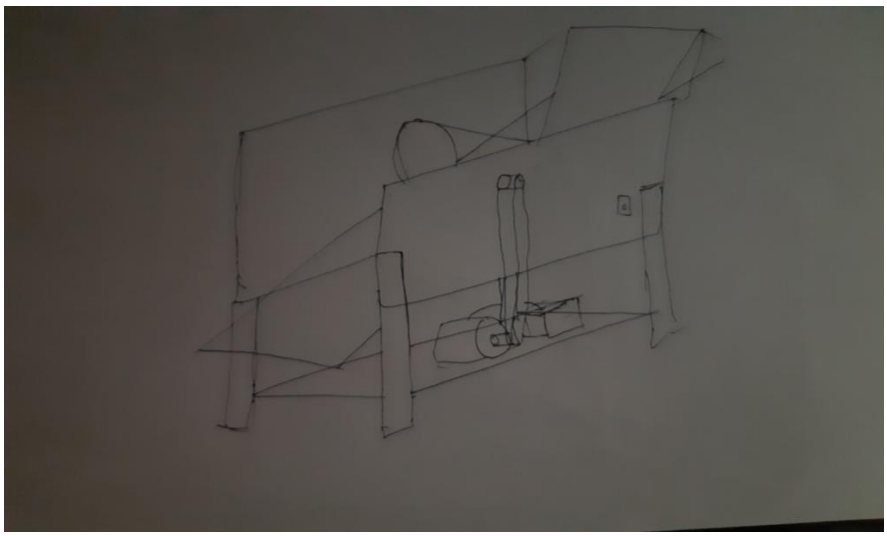


Figure 3.2 Sketch/Design 1

This is the first design for the machine. After doing some analysis, the machine did not have the advantages to being move around. So, the wheel has been added to the design so it will be easily move around.

3.5.2 Design 2

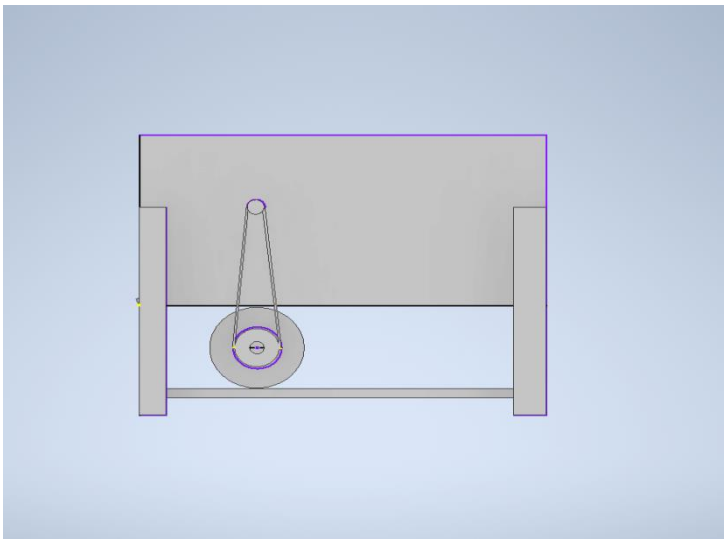


Figure 3.3 Sketch/Design 2

This is the second design of separator machine. By adding the wheel at the stand, it will be more ease to the pepper planter to move the machine around. Hence, it will cost less energy to move the machine around.

3.5.3 FINAL DESIGN

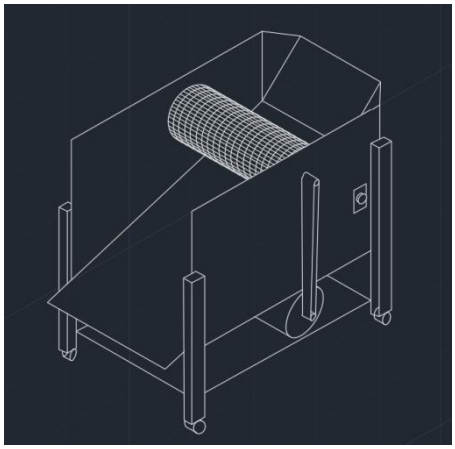
The design were based on traditional pattern which used before the modern era. It was carefully drawn on a sheet of paper to modified the existing concept and applying it on this machine. For separator machine trays, it is generally produced in the form of a angled sheet. This process involve cutting the plywood plain in about 2½ foot . The tool used in this process was wood cutting machine and polished with wood polisher.

A part of it, drilling process were done for placing a measured diameter to ease screwing. Instead of using glue, a half inch of screw would make the structure even tougher as its require steady and long-last performance. Perfect dimensioning help to prevent the body mistakenly cut or imperfection placement. Bottom side were fixed by adding a plain plywood to support the legs. Two tray were made to restore the stalks and the peppercorn placed at the bottom side of the machine. 100 RPM motor placed underneath the angled plain plywood work as power sources to spin the rotor and the top side. The motor supported by the pulleys and Vee Belt to transfer the

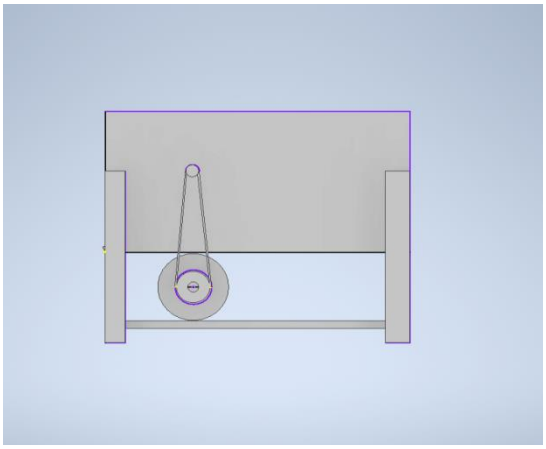
power to the rotor. To achieve the complete process, a rubber wheels were added to make it portable and easy lifted machine.

3.3 DATA ANALYSIS METHOD

Black pepper separator machine has been through our trial according to the specific test. The test imposed on the black pepper separator machine is using 10kg of black pepper to separate from it's stems same goes to the traditional separator machine which has followed the specified specifications. That is to say, it is safe to use by any user. The existing black pepper separator machine only could only produce 1kg of black pepper to separate in 1 hours. With the new design user can produce a lot more product by using the machine. This will make the black pepper productivity increase from 2 hours to produce 1 kg of black pepper to only 30 minutes.



(a) Product design



(b) Product fabrication

Figure 3.3 (a) product design and (b) product fabrication

3.4 PROJECT REFINEMENT PROCESS

Figure 3.4 : Fabrication and installation

As shown in Figure 5, the fabrication process comprises of cutting parts for the separator machines for all the parts needed. All the parts of the machine is joined by using 2½ inch screw. After cutting all the parts, the separator machine is assembled according to the specification. Some of the parts have been and cut drilled and joined together by screw.

3.4.1 Finished product

As shown in figure 6, Finishing is added accordingly. The finished prototype is then tested and adjustments are administered as needed. Only then the end product is deemed suitable to use.

Figure 6: Finished product

3.6 SUMMARY OF CHAPTER

In conclusion, the methodology flow chart is very important that involved design, fabrication, installation and testing process of product. The best design will be chosen to proceeds with selection materials. Data analysis is done systematically in the methodological study to know the facts and information to support the research instrument and describe more clearly in this study.

This chapter described the research methodology, including the population, sample, data collection

3.7 Marketing Plan

1. Customer Segments

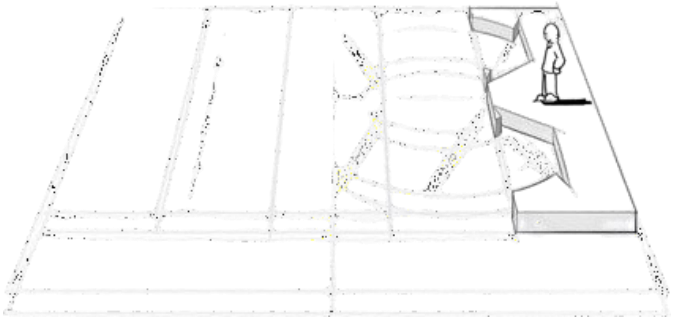


Figure 3.7.1 Customer Segments

- Educational Institution
- Labour Worker
- Hardware
- Middle range income

2. Value Proposition

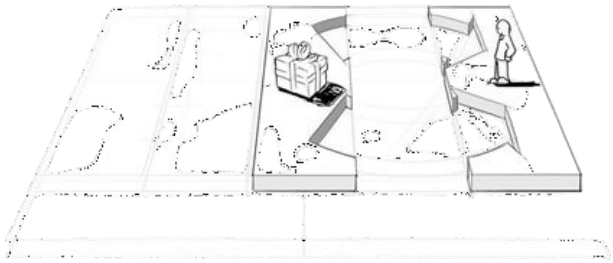


Figure 3.7.2 Value Proposition

- Introducing Black Pepper Sifter Machine portable and convenient that can be use by our local agriculturist. Using mechanical and electrical components.

3. Channel

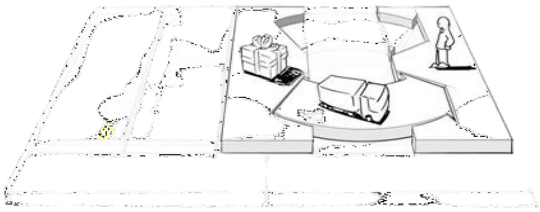


Figure 3.7.3 Channel

- Store location - Hardware shop and supplier company
- Online marketing - social media marketing, e-Commerce marketplace

4. Customer Relationship

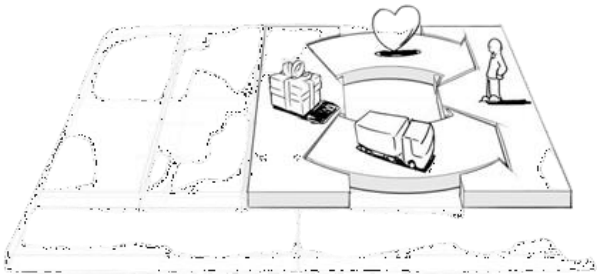


Figure 3.7.4 Customer Relationship

- Customer service face to face
- Delivery service to direct buyer
- Using face-time

5. Revenue Stream

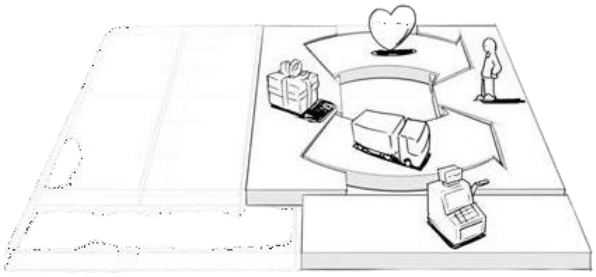


Figure 3.7.5 Revenue Stream

- Selling
- Delivery service
- Renting/ Lending

6. Key Resources

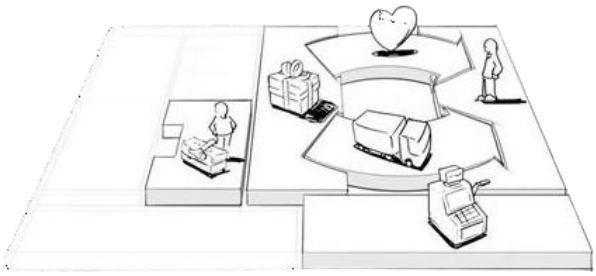


Figure 3.9.6 Figure Resources

- Patterning
- Capital (equipment, manpower, machine)
- Entrepreneurship

7. Key Activities

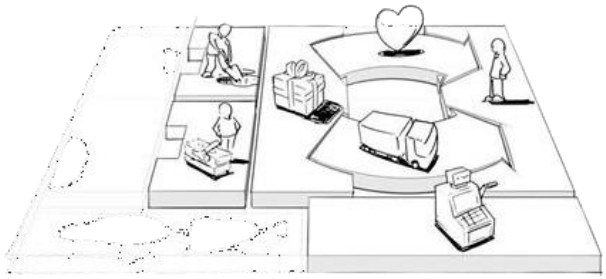


Figure 3.7.7 Key Activities

- Selling and marketing
- Event and exhibition
- Research and development
- Collaboration

8. Key Partners

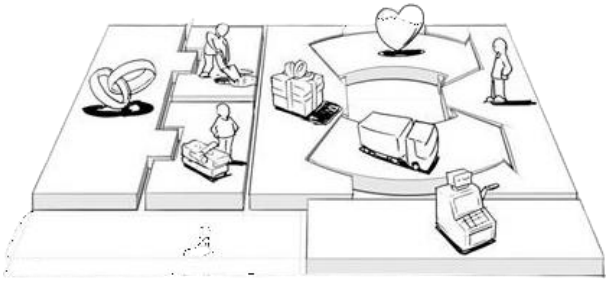


Figure 3.7.8 shows Key Partner

- Agent and dropship
- Courier company
- e-Commerce marketplace
- Buyer - supplier relationship

9. Cost Structure

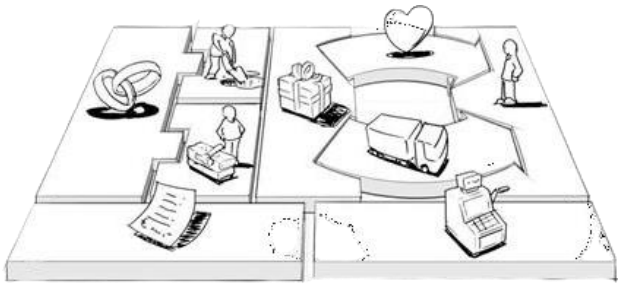


Figure 3.7.9 Cost Structure

- Logistics
- Store Location online and offline
- Marketing Staff
- Advertising

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Introduction

After completing all the process, the project will be built and run. From the complete project we can see the result and analyse the result. This chapter will explain about the result of the project testing on our product which is Black Pepper Sifter and the tools that has been used in this project.

4.2 Demographic Profile

Basic information for 10 respondents for the questionnaire shows that the respondent consists of 5 males and 5 females. Which respond to the feedback had been given to the respondents.

Respondent that respond are from, 5 of them are from Mechanical Engineering Department,

2 of them from Civil Engineering Department, 2 of them from Electrical Engineering Department and lastly 1 of them from Department of Commerce. To wrap the feedback from result, all of the respondent agrees and on developing Black Pepper Sifter which emphasize safety features and help them in line marking process. They also give comment and feedback.

4.3 List of Feedback and Comment

Table 4.6 shows some feedback and comments that was fill up in the feedback form. This feedback and comment are from Polytechnic Sultan Salahuddin Abdul Aziz Shah.

No.	Feedback and Comment
1.	Easy to use, cheaper than other product and more comfortable
2.	Portable and would be easy to move
3.	Adds variation in terms of the size of the rotator and the quantity that can be produced
4.	Very suitable for sale in the market because it makes it easier for consumers
5.	Stunning innovation

Table 4.4 Feedback and Comment

Figure 4.2 Final product

4.3.1 Verification

Black pepper separator machine has been through our trial according to the specific test. The test imposed on the black pepper separator machine has followed the specified specifications. That is to say, it is safe to use by any user. The existing black pepper separator machine only could produce 1kg pepper at 1 hour according to how hardcore the usage is. With the new design by adding the motor, it can produce 1kg of pepper in just 30 minutes. This machine can increase the pepper productivity for the pepper planter. The new design of black pepper separator machine is mounted with 4 rubber tyre. Hence, it will help the pepper planter to move the machine easily.

4.3.2 Product testing

The project of Black pepper separator machine was designed to increase productivity and ease the pepper planter. The black pepper separator machine can be operate automatically by turning on the motor. In generally, the innovation of black pepper separator machine is to meet users requirement. Project Design was successfully proposed and fabricated according to designed material and fabrication method as exhibit in Figure 3.

What's more, this machine is can be maintenance by users itself and it did not cost a lot of money for the users. This device is a eco-friendly with no harm to ecosystem.

4.4.1 Finished product

As shown in figure 6, Finishing is added accordingly. The finished prototype is then tested and adjustments are administered as needed. Only then the end product is deemed suitable to use.

Figure 4.4.1: Finish product development

4.5 DATA ANALYSIS

Modern Black pepper Separator Machine		
Load(kg)	1kg	5kg
Times taken to Produce	30 minutes	3 hours

Traditional Black pepper Separator Machine		
Load(kg)	1kg	5kg
Times taken to produce	1 hours	5 hours

Table 4.5.1:Comparisons between loads and time

Characteristic	Black Pepper Siting Machine	Other Black Pepper Sifting Machine
Cost	Affordable	Expensive
Difficulty handling	Easy	Difficult
Size	Medium	Large
Quantity	1 kg per hour	1 kg per 2 hour
Effectiveness of the motor	Medium	High
Accuracy	Medium	High

Table 4.6 Comparison between our product and other product

4.6 Summary of Chapter

This chapter will explain about the result of the project on our product which is Smart Line Marking Machine. The project will be built and run. From the complete project we can see the result and analyse the result. A line marker is a device or machine with which lines or markings are drawn on a sports field or pitch. Smart Line Marking Machine saves time and is easily handled by less skilled operators. It is more accurate and in accordance with the set standards. In addition, the work produced is neater and more precise.

Disediakan oleh:
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CHAPTER 5

DISCUSSION, CONCLUSION, AND UPGRADE PLAN

5.1 Introduction

The conclusions drawn in this chapter include a comprehensive conclusion on the overall design that has been made. this conclusion involves the construction of a more user-friendly and more effective design in this study.

5.3 Conclusion

As conclusion, the engineers need to plan, observe the development and identify the problem to improve the existing design with new innovative features and design of the product with more ease for the respondent and locals to use as well as increasing the quality of life.

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5.4 Upgrade plan

Far the future, the rotor were attached with mesh wire to thresh the black pepper from its stalks. As suggested, the rotor should be attach with plastic rode to thresh the black pepper perfectly and avoiding the black pepper from shattered. Apart of that, the motor would recommended have around 1~2k RPM to speed up the harvesting process.

5.4.1 Motor

This project involves the extensive use of manpower to move and lift materials to facilitate heavy work intends to add motor features to this project. Adding

motor features to this project will make the project easier to use. Instead of pushing the wheelbarrow users only need to use the motor. This feature reduce the amount of energy usage so that they can do the work in a longer period of time.

5.4.2 Material

To increase the amount of load that the black pepper separator machine can work with. The quality of the material that is used in making of the separator machine the from base to the top need to be improve. Steel durability is very important to produce a durable product

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APPENDIX

APPENDIX A **The Comparison Between Our Product and Other Product**

APPENDIX B **Total Cost**

APPENDIX C **PITEX 2020 Poster**

APPENDIX A – The Comparison Between Our Product and Other Product

Characteristic	Our Product	Other Product
Name	Black Pepper Sifter	ZZ Macro Motored Black Pepper Sifter
Price	RM150	RM 3000
Weight	12.5 kg	200 lbs
Motor speed	1400 rpm	1000 rpm
Rotator use	Plywood roller wrapped with mesh wire	Using steel thresher
Capacity	100 kg	2000 kg (slower)

APPENDIX B – Total Cost

No.	Material	Quantity	Price per unit (RM)	Total (RM)
1.	Plain Plywood	3	10.70	31.10
2.	Rubber Wheels	1 bundle	15.90	15.90
3.	Rotor	1	70	70
4.	Thick wood	10 ft	17.70	17.70
5.	Screw (2½ inch)	1 pack	2.60	2.60
6.	Hand tools	5	50	50
7.	Drill bit	2	20	40
8	Motor	1	189.90	189.90
TOTAL				RM417.20

Table 4.2.1 : List of Components cost

APPENDIX C - PITEX 2020 Poster

MESIN PEMISAH LADA BERMOTOR

Nama ketua kumpulan :RODERICK RENGGIE ANAK STANLEY KUDA
Institusi:POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
Nama ahli kumpulan :JOHANNES JARRET JIRAM ANAK KUMPING
Institusi:POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

PENERANGAN INOVASI

Mesin pemisah lada bermotor ini adalah mesin lada konvensional yang diguna pakai pada masa kini yang ditambah menggunakan motor untuk tujuan mempermudahkan proses pengeluaran biji lada hitam.

IMPAK INOVASI

-Menyingkatkan masa untuk proses pengeluaran

-Pemodenan dalam sektor penanaman lada

-Mampu memajukan sektor Industri Kecil Dan Sederhana(IKS) dalam bidang perniagaan lada.

-Dapat dijual kepada kilang-kilang pengeluar lada hitam

-Dapat disebarkan melalui konvensyen inovasi dan melalui pitching di jabatan yang berkaitan seperti FAMA.

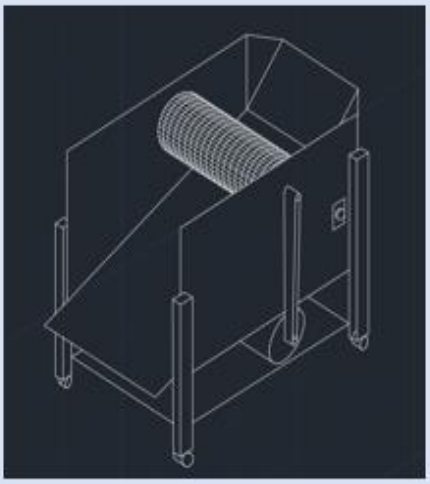
OBJEKTIF

-Untuk menyingkatkan masa pengeluaran biji lada hitam dan mampu meningkatkan jumlah pengeluaran dalam masa yang singkat.

-Untuk mempergiatkan aktiviti penanaman lada bagi pekebun-pekebun kecil.

-Memperkembangkan sektor Industri Kecil Dan Sederhana(IKS) bagi mngeluarkan produk lada hitam.

BLOK DIAGRAM/CARTA ALIR OPERASI



Project Planning

Table below shown a planning schedule and implementation of project production

Activities.

Table 1 planning schedule and implementation of project production Activities.

Project Activities	Weeks														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PROJECT PLANNING															
PROJECT DESIGNING															
PROJECT MATERIAL COLLECTION															
FRAMEWORK COACHING															
IMPLEMEN PROJECT															
PROJECT NEADNESS															
TESTING															
END															