POLITEKNIK BANTING SELANGOR

AUTOMATIC VEGETABLES SLICER

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This report was submitted to the Mechanical Engineering Department as part of the requirements for the award of the Mechanical Engineering Diploma

MECHANICAL ENGINEERING DEPARMENT

JUNE 2023

STATEMENT OF AUTHENTICITY AND PROPRIETARY RIGHTS

RESEARCH OF AUTOMATIC VEGETABLES SLICER

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As our group supervisor	MS ASIAH

ACKNOWLEDGEMENT

This thesis becomes a reality with the kind support and help of many individuals. We would like to extend our sincere thanks to all of them. Foremost, we want to offer this endeavour to Allah S.W.T. Almighty for the wisdom he bestowed upon us, the strength, peace of our mind and good health in order to finish this research. Even though there is many challenges and obstacles that we have been face in order to finish up our final year project assignment during fabrication and paperwork, we manage well to overcome it with our own patience, struggles and strength among the group members.

We would like to express our gratitude towards our respected supervisor, Mrs Asiah Binti Yunos for the encouragement, guidance, invaluable support and motivations which helped us in completion of this project. I would also like to drop our sincere appreciation to the role of the staff of Mechanical Workshop for giving the permission to use all required machinery and the necessary material to complete this project.

Thank you as well to the team for coming up with this idea together successful. Without your encouragement and support, we wouldn't have been able to complete this work as well as our other friends. In addition, many thanks to our colleagues who worked hard to produce this work and exchanged ideas to help us complete this project. Finally, we believe that the work we undertake will broaden our knowledge and improve our cooperation and responsibility.

Thank you.

ABSTRACT

A vegetable slicer is basically a vegetable slicer that can slice automatically to make it easier for caterers to cut large quantities of vegetables. Nowadays, there are many types of vegetable slicers can be found in the local market, but they are still not satisfied with the customer's needs. Slicer is used in places such as restaurants, factories and much more. The idea of this project is to design and produce a slicer that can help in a safe way with less effort compared to a manual vegetable slicer. This slicer is designed and suggested for restaurants. The product is made as a prototype and will be proposed to interested companies commercialize it.

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LIST OF SYMBOLS

SYMBOL	
f	Frequency
m	Mass
P	Pressure
r	Radius

LIST OF ABBERVATION

DCV	Direct Current Motor
RM	Ringgit Malaysia
V	Voltage
RPM	Rotation Per Minute
AC	Alternating Current
m	Metre
mm	Millimetre
cm	Centimetre

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In the present era, people are still very busy going about their jobs. Today's advancements have made operations easier, quicker, and more productive. According to the report, manual methods of chopping vegetables are still used by the majority of Malaysian restaurant operators.

Due to consumer interest, the restaurant business has grown quickly in recent years. Numerous members of this generation are pursuing careers in the food industry. Of course, Malaysia, which is made up of several racial groups, has a variety of cuisines, not to mention a variety of cuisines, and has grown to be a favourite among the populace. Therefore, the people's top priority is the food industry sector.

Sadly, problems arise in the food industry when vendors take a long time to deliver meals to clients. This is so that ingredients can be prepared, chopped, and produced as part of the food processing process. Furthermore, because each cuisine requires a different preparation method, cutting components takes a lot of time. Most individuals take a very long time to cut an onion. This is due to onions' production of an amino sulfoxide that results in the gas syn-propanetriol-S-oxide. That gas is what causes the wet eyes.

Therefore, the design and manufacture of vegetable cutting machines is the main emphasis of this study. In order to design, the driving mechanism for this machine must be determined. The system will undergo a series of inspections to make sure it complies with the criteria and is functioning properly. This technology is made to make it easier to process veggies while also ensuring customer safety.

1.2 PROBLEM STATEMENT

In restaurants and other establishments that provide food, people who prepare the meal are employed. Even though many individuals enjoy the knifework, processing a lot of veggies takes time. Quality is equally crucial in the industrial food sector. Vegetables cannot be consistently sliced by humans for long periods of time since our steady hand may even falter. Human negligence results in injuries as well. Automatic vegetable slicers are created to address this issue. The goal of the project is to develop and produce an autonomous vegetable slicing device that uses less labour in food production, has better handling capabilities for big quantities of onions, and has enhanced safety features to protect users from harm. Using the 'Automatic Vegetables Slicer,' vegetables cutting can be accelerated and the pressure on restaurant traders can be eased.

1.3 OBJECTIVE

The idea of this project is to design and develop an Automatic Vegetables Slicer mechanism with little effort compared to doing it manually. The project will include several objectives to achieve, there are:

- To save energy and also save time to cut vegetables.
- To design an automatic vegetables slicer that is easy to assemble and dis-assemble.
- To eliminate the contamination of vegetables.

1.4 SCOPE OF PROJECT

The main scope of production of our products are:

- Cut off no-batt vegetables.
- Dedicated to traders in restaurants.
- Cut up food into slices that are about the same size.

1.5 SUMMARY

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-constructed the scope of this project clearly above. With that said we are also going to discuss the article review of each and every component we have been used in our project in the following topic which is Literature Review.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

There will be three cutting method evolutions shown in this chapter. Each of these three approaches has benefits and drawbacks. According to Waldbaum (2015), a vegetable is a herbaceous plant or a portion of a plant that is eaten in whole or in part. Vegetable production has increased globally over time.

Vegetable production on a global scale from 1970 to 2023. The surge was mainly caused by ongoing technical advancement. In order to supply supermarkets and some food businesses, like the canning industry, vegetables are farmed on a big scale. The main difficulty is making the vegetable smaller so that the consumer can easily eat it. Cutting and slicing have been around for a while, and many methods have been employed to carry out specific jobs. Typical techniques involved the use of knives and other tools and equipment. These methods have taken a lot of time and effort, especially given how busy our lives are.

Digital computers have slowly become an essential component of daily life as the contemporary age has evolved. Compared to their manual counterparts, automated computers have consistently saved a large portion of the manual equivalents. The time it takes for people to complete a task and this change have significantly influenced a more competitive and rapid style of doing things. 5 In the late 1990s, automation was the primary focus of design (Tony, et al., 2014). The engineering sector put in a lot of effort day and night to transform modern automated items significantly.

These commercial kitchen spaces must have kitchen appliances. Modern kitchen appliances are in high demand on the global market because of their unmatched quality,

durability, and high reliability. Therefore, the development of cutting techniques will be presented in this chapter, along with a comparison of our own models.

2.1.1 VEGETABLES SLICER CLASSIFICATION

The manual process of chopping vegetables with a knife. Knives have always been a need for daily life, serving as a cooking tool as well as a means of obtaining food and shelter. Stone was used to make knives throughout the Neolithic era. Later, as human history progressed, it began to develop items made of copper, bronze, and eventually iron for use as knives. Due to the availability of various types of knives on the market, the shape of the knife has been adjusted to become more specialised in order to progress the technology of these knife items.

2.2 CURRENT SYUDIES SLICER

2.2.1 Chef’s Knife

One of the most often used kitchen utensils is the chef's knife. The length of a chef's knife typically ranges from 8 to 10 inches to 14 inches. The 'Chef's Knife' is the most efficient tool to use while slicing food during preparation. Good for: pork, potatoes, cabbage, carrots, and onions.

Figure 2.1: Chef’s Knife

2.2.2 Paring knife

The paring knife is a small, all-purpose tool with a straight edge that can be used for delicate tasks like deveining shrimp, removing the seeds from jalapenos, "skinning," or chopping small garnishes as well as for peeling fruit and vegetables. Paring knives typically have a length of 6 to 10 cm. Another method for peeling fruit and vegetables is to use a peeler. Such a knife should not be used for tough vegetables because of the risk of harm posed by its light weight. The best for: fresh herbs, apricots, fruits, apples, onions, and garlic.

Figure 2.2 Paring Knife

2.2.3 Serrated Knife

Cutting food with a rough outside and softer interior, such as a loaf of crusty bread, is best done using a knife with a serrated edge that has a pelleted, toothlike edge. The idea behind a serrated knife is similar to that of a saw: As the blade smoothly cuts through the food, the teeth of the blade catch and then rip. Best for: pizza, pies, quizzes, citrus fruits, pies, tomatoes, and bread.

Figure 2.3: Serrated Knife

2.2.4 Hand slicer

The shape of this product has been a useful addition to cutting veggies with solids with greater yields in order to increase production and stay up with contemporary technological advancements. The materials used to make this hand slicer are of the highest quality, and they indirectly benefit the economy. Stainless steel is used for the tool frame on the cutlery and cabinet components. This powerful vegetable cutter is thought to be more precise and dependable than using a manual knife. This is demonstrated by the skill and test of the vegetable cutting instrument.

Figure 2.4: Hand Slicer

2.2.5 Vegetable cutting machine

These solids can assist in making cuts of the same size in order to first acquire a sense of this contemporary flow with vegetable cutting machines. Vegetable cuts may differ in size from those made with standard blades and tools, and they may also be inaccurate or ugly. Given that human cutting is the norm for most vegetable cuts, large slices may also come in different sizes. Because this effective automated vegetable cutting equipment continuously works to save time, using it will also help to render vegetable cutting in accordance with faster time. Indirectly, shortfalls in cutting time may result in the usage of this manual cutting instrument to successfully chop both robust and more soft veggies.

Figure 2.5 Vegetables Cutting Machine

2.3 COMPARISON OF OUR PRODUCT WITH PREVIOUS AND CURRENT TECHNOLOGY

Properties	Onion cutting machine	Wood onion slicer	Knife
Photo			
Mode operating	Electric operated	Manual	Manual
Material	Zink stainless steel	Wood	Carbon steel
Power Supply	Rechargeable Battery	Manual/Operator	Direct Power Input
Size	High	Medium	Low
Price	Large	Medium	Small

Table 2.1 Comparison of product with previous and current study

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

Research methodology simply refers to the practical “how” of any given piece of research. More specifically, it’s about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives. In this moment, we are doing and getting some needed research about the onion cutter prototype. the methodology chapter should justify the design choices, by showing that the chosen methods and techniques are the best fit for the research aims and objectives, and will provide valid and reliable results. A good research methodology provides scientifically sound findings, whereas a poor methodology doesn’t.

3.2 GANTT CHART

This shows a Gantt chart in our project production process starting from the first week until the 14th 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**.**

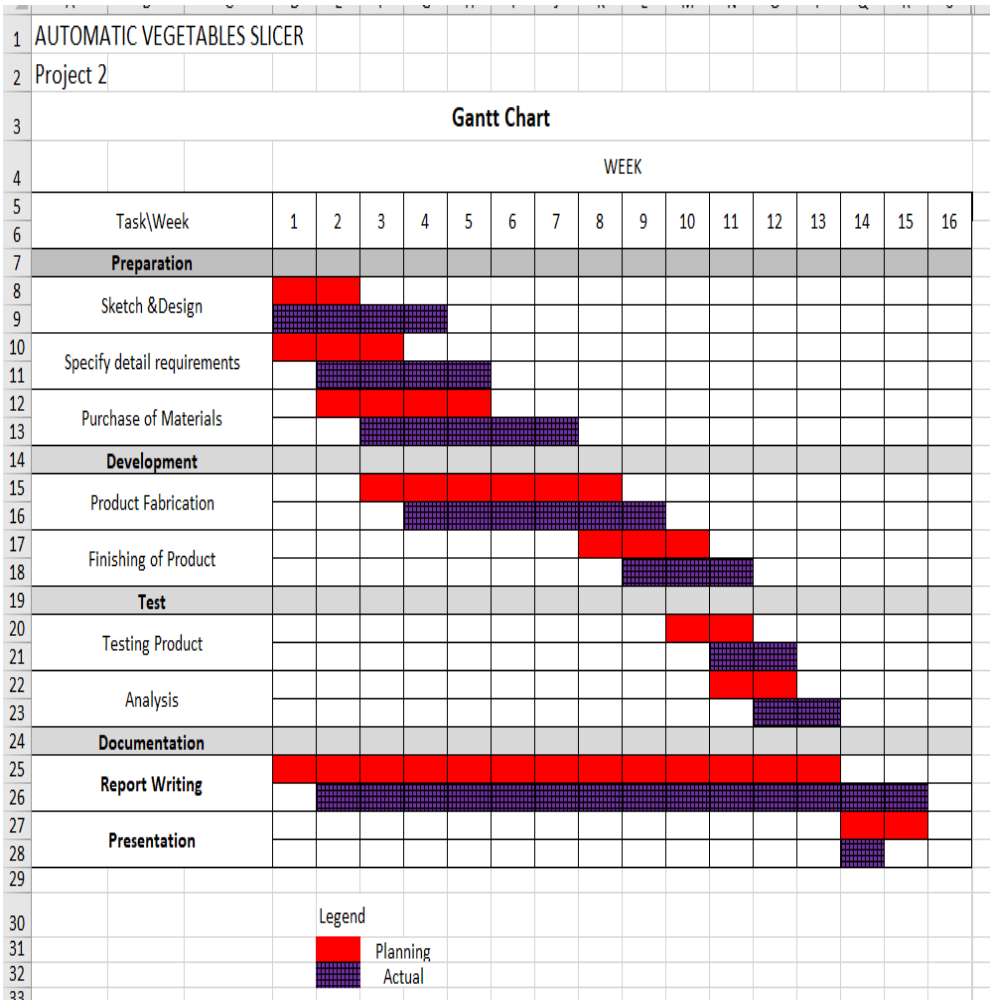

Figure 3.1: Gantt Chart Project 2

3.2.1 FLOW CHART

Project planning is one of the important parts of this project in order to plan a project implementation. Flow chart and Gantt chart are using during the project progress as it provides a planning schedule. Flow chart shown in Figure below represent the steps have been taken. Meanwhile, Gantt Chart in figure below show the duration of each task or activity until the project design completed.

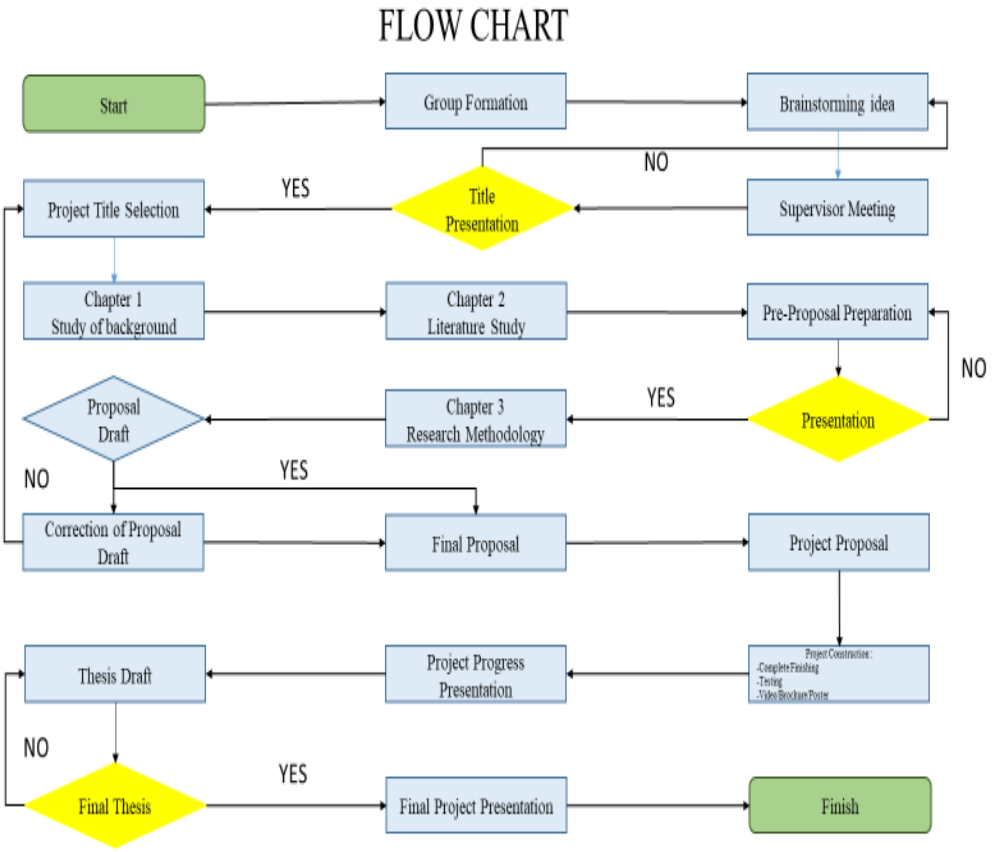

Figure 3.2: Flow Chart Project 2

3.3 PROJECT DESIGN SKETCH

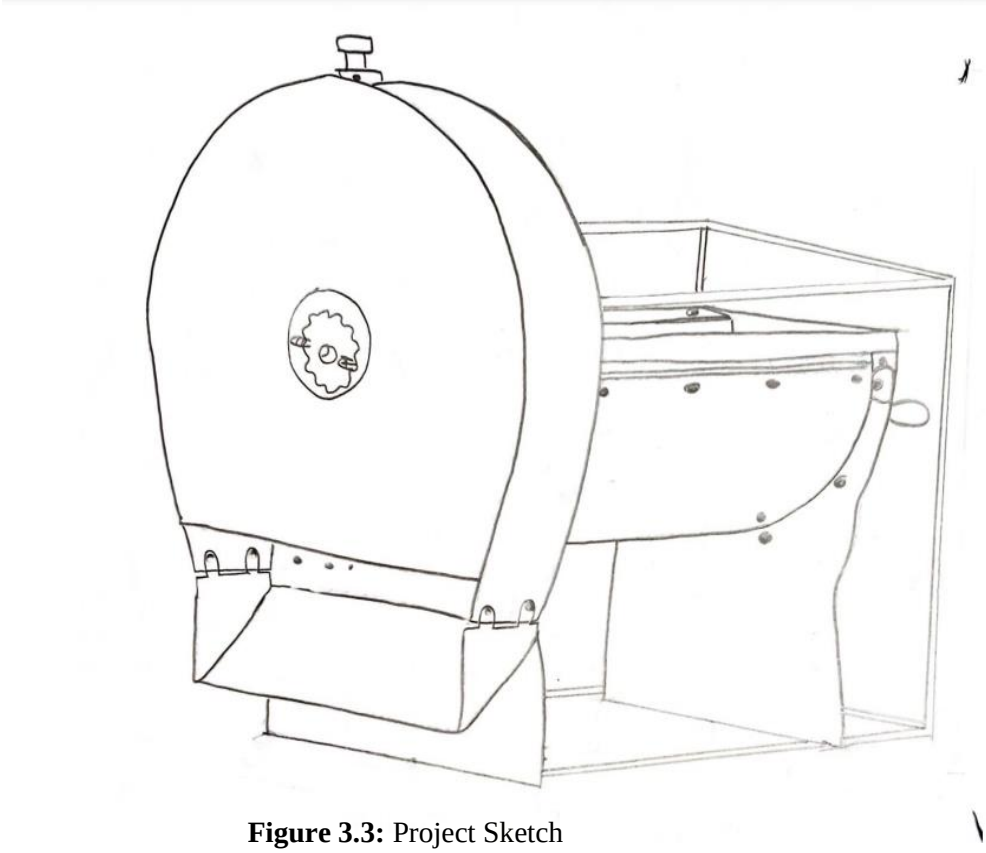

Figure 3.3: Project Sketch

3.4 PROJECT PART DRAWING

3.4.1 Frame

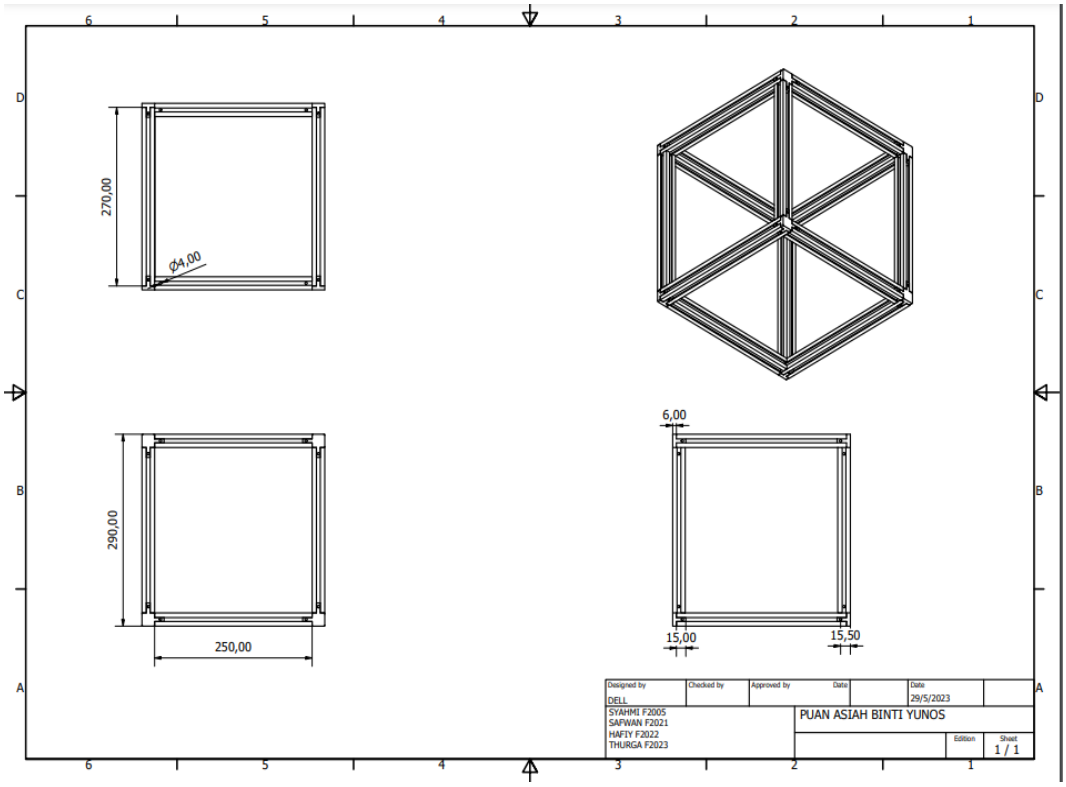

Figure 3.4: Frame

The frame is designed as shown above. The frame is designed for a height of about 400mm and is made up of aluminium.

3.4.2 Slicer Knife

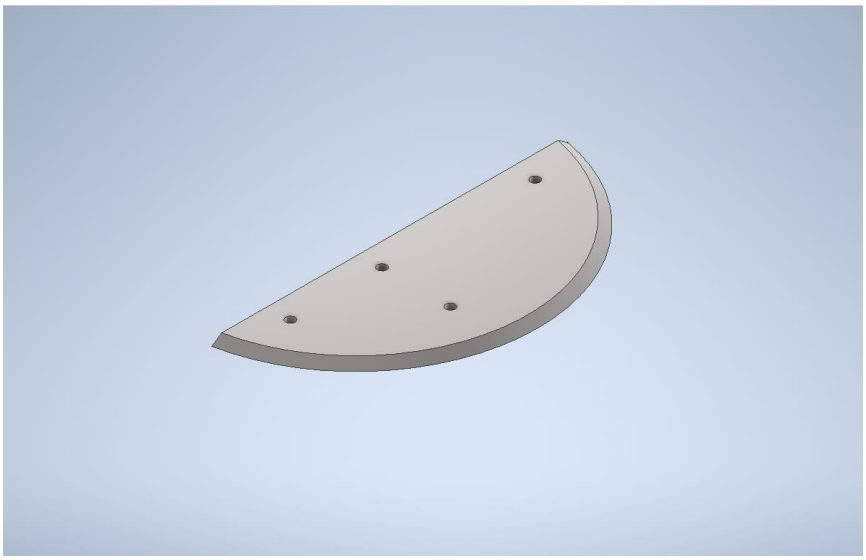

Figure 3.5: Slicer Knife

The slicer knife we use is a hard material that can withstand a lot of wear and tear. It is easy to clean and maintain. It is often used in high-quality knives. Slicer knife help produce thin, even slices of vegetables with ease.

3.4.3 Motor

Figure 3.6: Motor

We use 775 DC motor max 21000 rpm DC 12v-24v ball bearing large torque high power low because it can help to quickly and efficiently slice a wide variety of vegetables. One advantage of using a 775 DC motor with a maximum speed of 21000 RPM, a voltage range of 12V-24V, ball bearings, large torque, high power, and low noise in an automatic vegetable slicer is that it can help to quickly and efficiently slice a wide variety of vegetables. The high RPM and torque of the motor can help to quickly and easily slice through even tough or dense vegetables, such as carrots or potatoes. Additionally, the ball bearings in the motor can help to reduce friction and wear, which can help extend the lifespan of the motor and reduce maintenance requirements. Finally, the low noise level of the motor can help to reduce noise pollution in the kitchen, which can be especially important in-home kitchens or other environments where noise is a concern. Overall, using a 775 DC motor in an automatic vegetable slicer can help to improve the efficiency and performance of the machine, making it a valuable tool for any kitchen or food preparation area.

3.4.4 3-Way Inner L Bracket/ Interior Corner Bracket

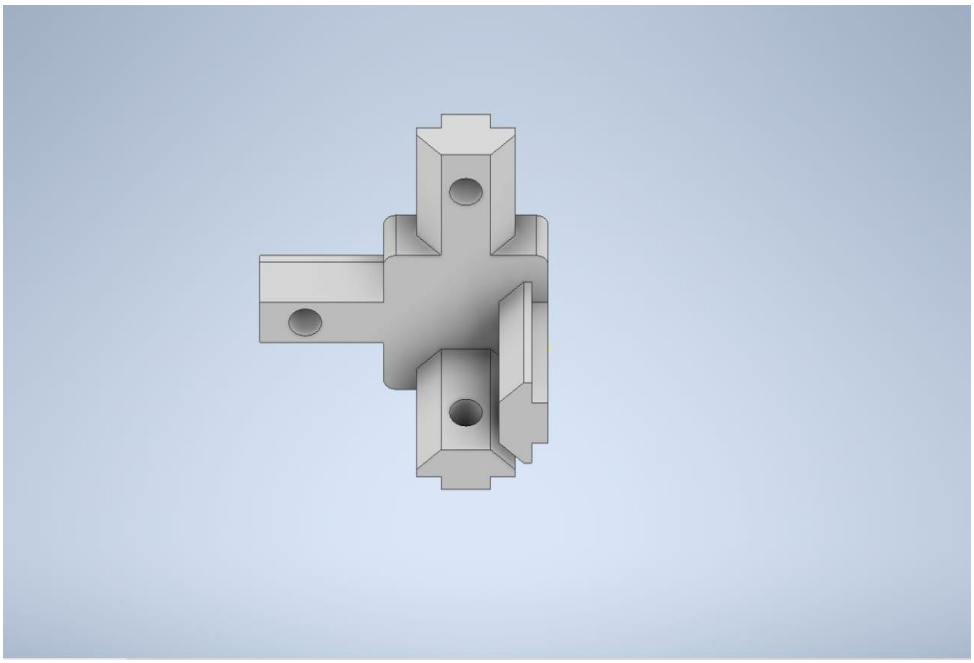

Figure 3.7: 3-Way Inner L Bracket/ Interior Corner Bracket

A 3-way inner L bracket or interior corner bracket is a type of hardware used with aluminium profiles. It is designed to connect three profiles at a 90-degree angle, creating a strong and stable joint. The 3-way inner L bracket typically has a compact and low-profile design, making it a popular choice for a variety of applications. The bracket is typically made from high-strength aluminium alloy, which provides excellent durability and corrosion resistance.

3.4.5 Spring

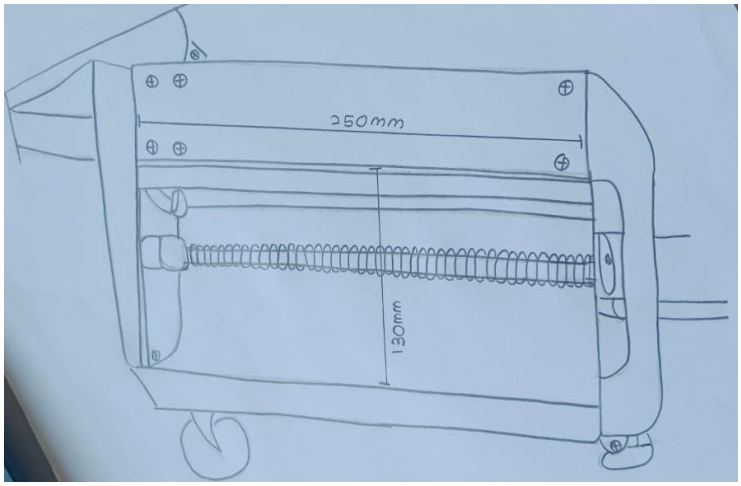

Figure 3.8: Spring

The spring in an automatic vegetable slicer is typically located near the blade assembly. It helps to keep the blade securely in place, while also allowing it to move up and down as needed during the slicing process. The spring is designed to provide just the right amount of tension, so that the blade moves smoothly and evenly through the vegetables. This helps to ensure that the slices are consistent in thickness, and that the slicer operates safely and efficiently. Overall, the spring is an essential component of any automatic vegetable slicer, and plays a critical role in its performance and reliability.

3.5 PROJECT DESIGN DRAWING

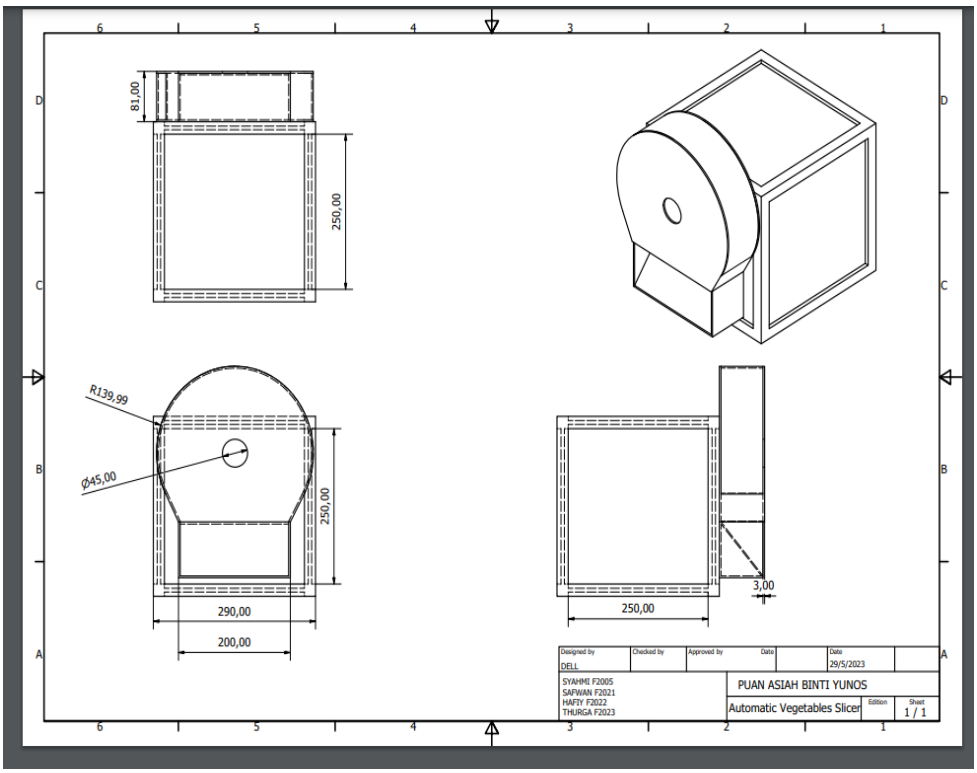

Figure 3.9: Dimension Assembly Drawing

3.6 COST ESTIMATION

The table below shows the list of costs we use in the production of the "Automatic Vegetables Slicer" starting from the purchase process, to the product finishing.

No.	Item	Description	Each	Qty	Price
1	Aluminium Profile standard	EU 2020/1m	RM22.50	4	RM90.00
2	Aluminium Profile standard	EU2020/50cm	RM11.00	6	RM66.00
3	Aluminium Profile	2040/1m	RM35.00	1	RM35.00
4	3-Way Inner L Bracket/ Interior Corner Bracket for Aluminium Profile	EU2020	RM7.60	8	RM60.80
5	Black Cap Screw Hex Socket Bolt	M5/8mm	RM4.30	1	RM4.30
6	Nut Rhombus Hammer Head Fasten Nut Connector Profile Slot Nut C/W Screw Aluminium	M5	RM1.50	12	RM18.00
7	Nylon Handle for Aluminium Profile	2020/90mm	RM5.80	2	RM11.60
8	Aluminium Profile Slot Strip Cover Length Black	2020/1m	RM2.98	7	RM20.86
9	6pcs Set T-shaped Wrench Screw Tapping Thread	M3-M8 Screwdriver	RM11.74	1	RM11.74
10	Commercial Stainless Steel Slicer Knife	-	RM45.00	1	RM45.00
11	775 DC Motor Ball	Max 21000 RPM DC 12V-24V	RM 21.04	1	RM 21.04
12	Stainless Steel Plate Grade	1220mm×1830mm/1m	RM300.00	1	RM300.00
13	Stainless Steel Spring	2.5×20×250mm	RM10.00	1	RM10.00
		Total			**RM694.35**

Table 3.1: Cost Estimation

CHAPTER 4
RESULTS AND ANALYSIS DATA

4.1 INTRODUCTION

Analysis the results of an automatic vegetable slicer, it's important to consider a number of different factors. These might include the thickness and consistency of the slices, the speed and efficiency of the slicing process, and the overall quality of the finished product. By carefully analysing these factors, it's possible to gain a deeper understanding of how the slicer performs, and to identify any areas where improvements could be made. Ultimately, this can help to optimize the performance of the slicer, and to ensure that it meets the needs of users in a variety of different settings.

4.2 DATA ANALYSIS AND STATISTICS

In order to determine the success of the "Automatic Vegetables Slicer" to all communities, we collected the statistics and data shown below from users using the Google Forms platform.

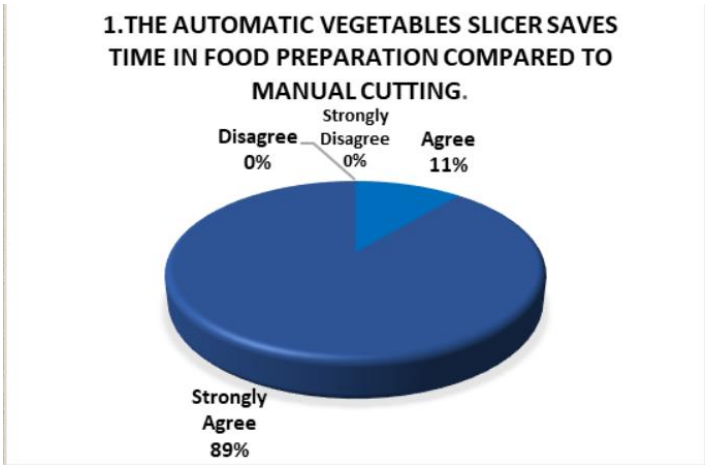

Figure 4.1: Pie Chart Question 1

Based on the pie chart above, 89% of consumers very agree and 11% agree with our product. All consumer agrees that our project be able to save time. From the survey they agree because the automatic vegetables slicer save time in food preparation compared to manual cutting.

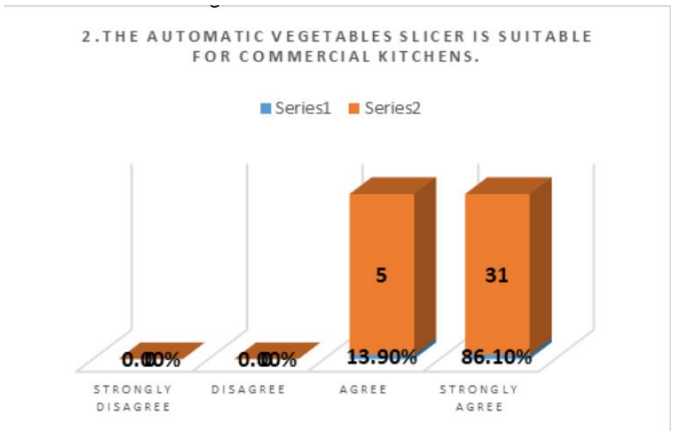

Figure 4.2: Bar Chart Question 2

From summary 31 responses are strongly agree with automatic vegetables slicer is suitable for commercial kitchens. 5 users agree with the automatic vegetable's slicer is suitable for commercial kitchens.

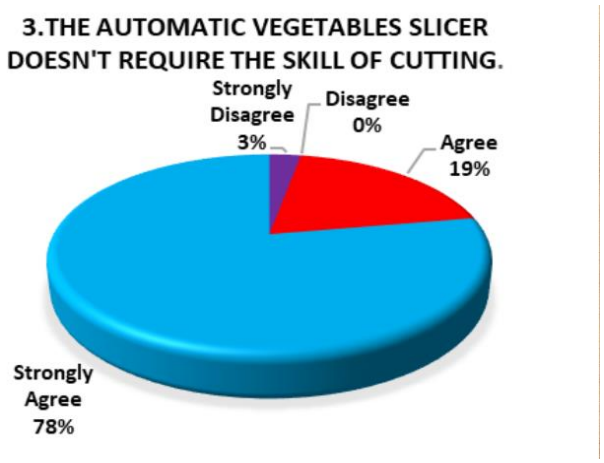

Figure 4.3: Pie Chart Question 3

28 users are strongly agreeing and 7 users are agreeing with the statement. 78% are strongly agree and 19% are agree but 3% are strongly disagree with the automatic vegetable's slicer doesn't require the skill of cutting.

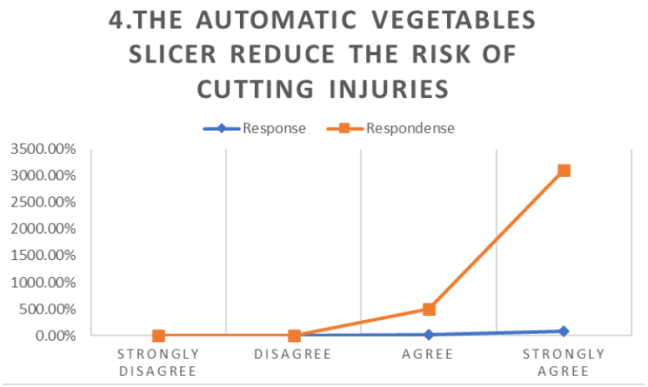

Figure 4.4: Line Chart Question 4

From summary 31 responses are strongly agree with automatic vegetables slicer reduce the risk of cutting injuries.

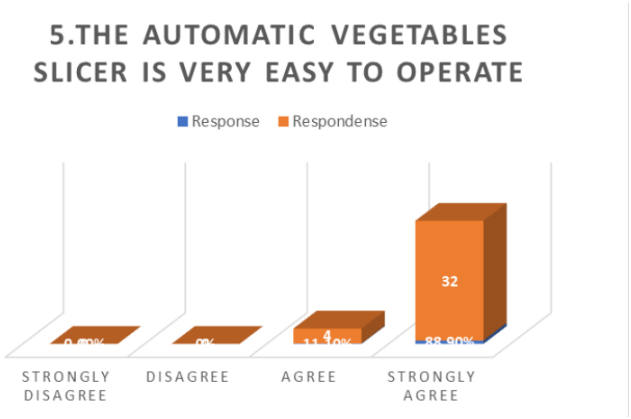

Figure 4.5: Bar Chart Question 5

Based on the graph, the majority of users (88.90%) strongly agree that the automatic vegetables slicer is very easy to operate. A smaller percentage of users (11.10%) agrees, albeit to a lesser extent, that the automatic vegetables slicer is very easy to operate

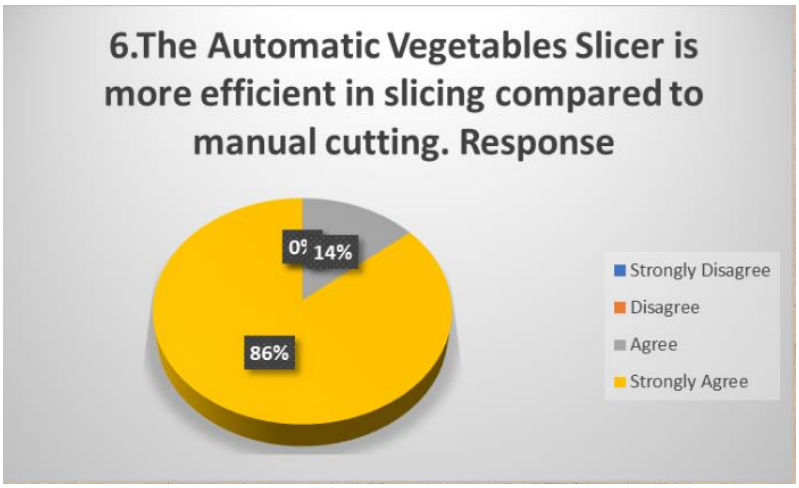

Figure 4.6: Pie Chart Question 6

31 users are strongly agreeing and 5 users are agreeing the automatic vegetables slicer is more efficient in slicing compared to manual.

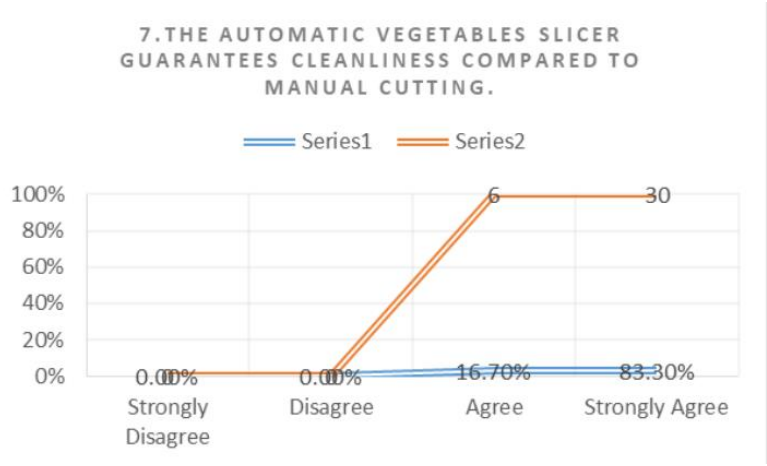

Figure 4.7: Line Chart Question 7

The graph above shows the automatic vegetables slicer is strongly agree guarantees cleanliness compared to manual cutting by the majority of users (83.30%). A relatively small number of users (16.70%) agreed with the automatic vegetable's slicer guarantees cleanliness compared to manual cutting.

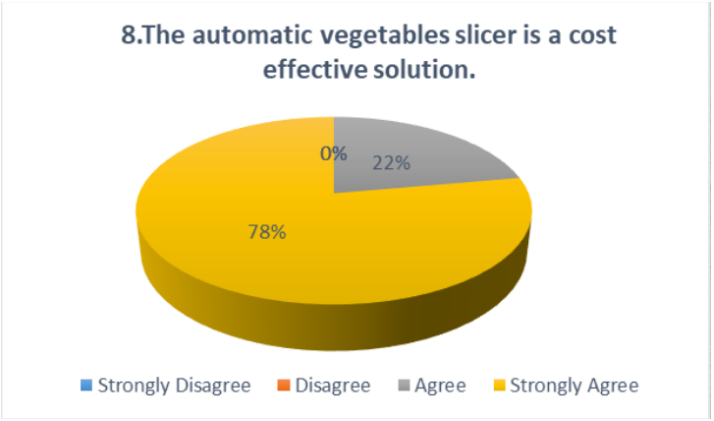

Figure 4.8: Pie Chart Question 8

Based on the pie chart above 78% very agree. The overwhelming majority of responders (78%) choose "very agree," showing that the slicer is a cost-effective solution. An additional 22% picked "agree," confirming the idea that the slicer is a cost-effective solution. Although a smaller number, it still represents a significant portion of consumers who appreciate the slicer is a cost effective.

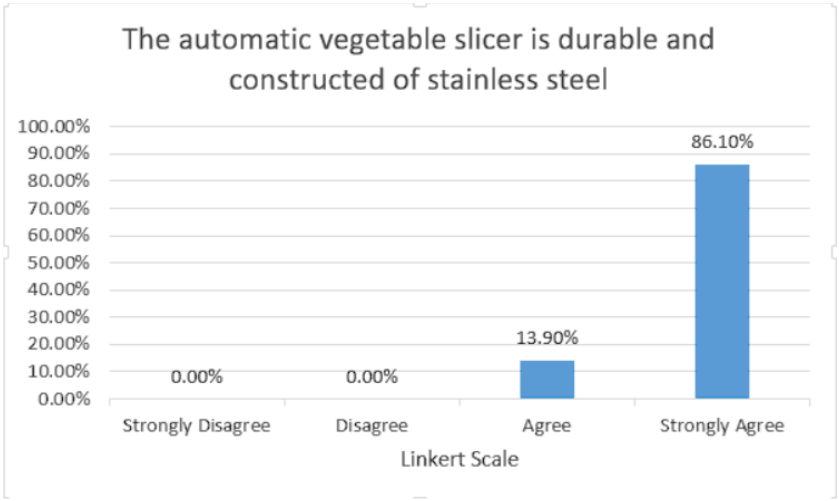

Figure 4.9: Bar Chart Question 9

According to the analysis majority of users (86.10%) strongly agree that the automatic vegetables slicer is durable and constructed of stainless steel. The other 13.90% users are agreed, albeit to a lesser extent. People well know the use of stainless steel is good for long-term use.

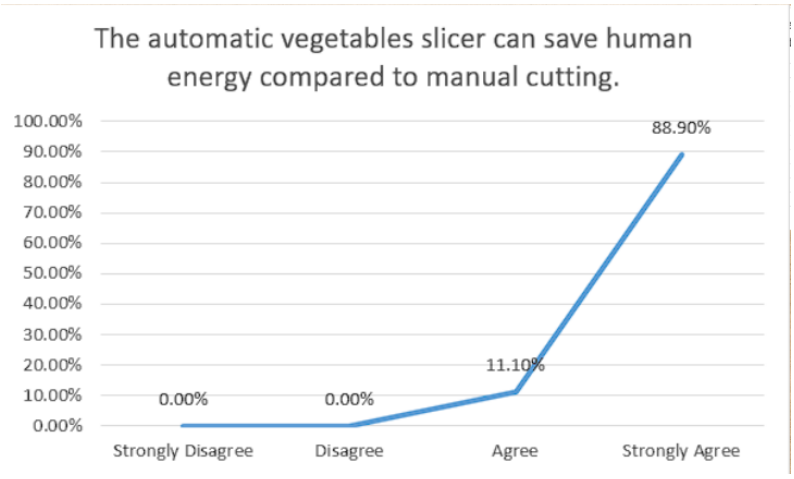

Figure 4.10: Line Chart Question 10

The use of automatic vegetables slicer machines can reduce the use of manpower. this has been proven based on the experience and knowledge of the 36 respondents that we got, 32 strongly agree with a percentage of 88.9% and 4 respond agree with a percentage of 11.1%.

4.3 PROJECT OUTCOME

The picture below shows the results of a project that we were able to develop in 14 weeks.

Figure 4.11: Outcome of the Project

4.4 ANALSIS

After the automatic vegetables slicer Q&A session, an analysis of findings and information gathered was done. According to user feedback, 75% of people said using and operating the automatic vegetables was simple. The use of automatic vegetables slicer machines can reduce the use of manpower. this has been proven based on the experience and knowledge of the 36 respondents that we got, 32 strongly agree with a percentage of 88.9% and 4 respond agree with a percentage of 11.1%.

In conclusion, the user the overwhelming majority of responders (78%) showing that the slicer is a cost-effective solution. An additional agree confirming the idea that the slicer is a cost-effective solution. Although a smaller number, it still represents a significant portion of consumers who appreciate the slicer is a cost effective

4.5 DISCUSSION

We planned out all of the duties involved in creating this project report, and we also had extensive discussions about it with our supervisor. To finish this report, we battled a lot and encountered several obstacles between week 1 and week 15. Even if there were certain issues, for example, in the early weeks, we lacked inspiration for our project-making. I have thus gone over all past Project 1 assessments and the model built up thus far, in addition to conducting extensive research on Google. In the workshop, we start working on the project creation after we have adequate understanding on how to generate ideas, following the designing that was done earlier for project 1.

In addition, several of the workshop machinery we use pose challenges since they are unfamiliar to us in terms of actual use. include bending, riveting, and grinding. This has an impact on how much time we need to learn how to use the machine correctly and how to customise it for our purpose. Additionally, a few minor injuries also occurred as a result of our improper use of the grinding equipment. Not only that, but even during the first several weeks of workshop labour, we bent our project's outside dimensions incorrectly, which required a lot of time and effort to fix.

Despite all of these difficulties, we nevertheless rise to the occasion to meet our supervisor's demands. We are able to finish this report in its entirety. Our supervisor provides checks and feedback so that we may get better at creating future projects in this cutting-edge industrial environment.

CHAPTER 5
CONCLUSION

5.1 INTRODUCTION

In this chapter, we will discuss the accomplishments of the goals and objectives outlined in the study "AUTOMATIC VEGETABLES SLICER". Additionally, we will provide suggestions and recommendations aimed at enhancing the product's efficiency to attract a wider consumer base and promote its purchase**.**

5.2 CONCLUSION

In conclusion, this project paper aims to develop a simple vegetable cutting mechanism for users. It can be said that the demand for this kind of system arises from day to day in our society. It is hoped that the design of this slicer meets the objective of being able to slice vegetables automatically and have a slicer that is easy to slice vegetables. It is also important to study the commercial viability and target market of the product so that it is value for money for the customer.

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APPENDIX

LAMPIRAN A	GANTT CHART
LAMPIRAN B	MARKET SURVEY QUESTIONNAIRE
LAMPIRAN C	CUSTOMER SATISFACTION SURVEY
LAMPIRAN D	LIST OF RESPONDENTS