



**POLYTECHNIC SULTAN SALAHUDDIN
ABDUL AZIZ SHAH**

**PROCESSING
THE FOOD DEHYDRATOR**

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**POLYTECHNIC SULTAN SALAHUDDIN
ABDUL AZIZ SHAH**

**FINITE ELEMENTS METHOD (FEM)
ANALYSIS COUPLED OF PROCESSING
THE FOOD DEHYDRATOR**

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CONFIRMATION BY PANEL OF EXAMINATION

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I declare that the work in this final report was carried out in accordance with the regulations of Polytechnic Sultan Salahuddin Abdul Aziz Shah. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post-Graduate, Polytechnic Sultan Salahuddin Abdul Aziz Shah, regulating the conduct of my study and research.

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ABSTRACT

In today's highly competitive business environment, it is crucial to have a sustainable operational that continuously strives for lower overall manufacturing cost. One strategy to have a lower overall manufacturing cost is to reduce product failure by developing the ability to predict production flaws at the earliest possible stage alongside the entire value-added stream since it can reduce expensive trial and error attempts at the real manufacturing floor. The final report is focusing on investigating major imperfection in coupled processes food dehydrator. A food dryer is an appliance that has a compact space and hot ventilation that can be used as a dryer. The use of food dryers is often used for small scale. In the process of drying, there is a process called (dehydration) where there is a process of transfer or production of food water content to reach less than the previous water content. This food drying machine can be done using a variety of ingredients, one of which uses food ingredients. Drying with foodstuffs has two main purposes, namely as to prolong the life of the food to be stored and by reducing the water content to prevent the growth of microorganisms. The objective of the study based on the machine we created is to be used as a source for humans to know that a food can last longer if using the machine. This machine can also facilitate the process of drying food more efficiently. It also shows the best effect on the food. the method of tool used is for food preservation where the food will be dried using a food drying machine. this aims to preserve food from the growth of bacteria and yeast through water removal. The findings of the study conclude that, this food dryer can clearly reduce the burden of consumers, especially business who use food dryers to produce sales results. Therefore, consumers who use these food dryers can produce more quality and durable food product results. our project, it can help in economic terms that traders can further process food products that are more durable and high quality as well as can save time.

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TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINER	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
AKCNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF FIGURE	vii
LIST OF TABLES	viii
LIST OF SYMBOLS	ix
LIST OF ABBREVIATIONS	x
CHAPTER ONE : INTRODUCTION	
1.1 Background of the study _____	1
1.2 Pobleml statement _____	3
1.3 Objective _____	4
1.4 Scope of the study _____	5
1.5 Significance of the study _____	6
1.6 Summary Chapter _____	7

CHAPTER TWO : LITERATURE REVIEW

2.1 Introduction _____	8
2.2 Overview Of Stainless Steel _____	9
2.3 Blower Fans Performance Evaluation And Efficient System Operation (HIB-P/HIT-P) _____	12
2.4 Overview Of Manufacturing Stainless Steel Tray _____	16
2.5 Summary Chapter _____	18

CHAPTER THREE : RESEARCH METHODOLOGY

3.1 Introduction _____	19
3.2 Methodology Flow Chart _____	20
3.3 Methods _____	22
3.3.1 Primary Data _____	23
3.3.2 Secondary Data _____	23
3.4 Quantitative Analysis _____	23
3.5 Benefits Of Food Dehydrator _____	23
3.6 How To Dry Your Food Dehydrator _____	24
3.7 How Does A Food Dehydrator Work _____	26
3.8 How Long A Food Dehydrator Long _____	27
3.9 Types Of Food Dehydrating proses _____	27
3.10 How To Determine The Right Dehydrator Temperature _____	28
3.11 Tips For Succesfull Food Dehydration And Preservation _____	29
3.12 Food Dehydration Vs Oven Drying Food _____	29
3.13 Summary _____	30

CHAPTER FOUR : RESULT

4.1 Introduction _____	31
4.2 Respondance Demography Profile _____	32
4.3 Component Cost _____	34
4.4 Result Of The Study _____	35

CHAPTER FIVE : CONCLUSION AND RECOMMENDATIONS

5.1 Introduction _____	46
5.2 Discussion _____	46
5.3 Conclusion _____	47
5.4 Recommendation _____	48
5.4.1 Recommended Food Dehydrator Details _____	48
5.5 Summary _____	50

REFERENCES _____	52
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APPENDIX

Appendix A – Feedback Online Form (Google Form) _____	54
Appendix B – Feedback Form _____	56

LIST OF FIGURE

Figure	Title	Page
Figure 1.1	Dehydration using sunlight	3
Figure 3.2	Methodology Flow Chart	20
Figure 4.2.1	Gender Of Respondent	32
Figure 4.2.2	Age Of Respondent	33
Figure 4.4 (a)(i)	Answer the Flow Chart	35
Figure 4.4 (a)(ii)	Answer The Question	37
Figure 4.4 (a)(iii)	Answer the Question	39
Figure 4.4 (b)	Respondents Perspective Of Food Dehydrator	40

LIST OF TABLES

Table	Title	Page
Table 4.3	Component Cost	34

LIST OF SYMBOLS

Symbols	
v	Voltan
Hz	Hertz
Kw	Kilowatt
%	Percent
A	Ampere
RM	Ringgit Malaysia
mm	Mili Meter

LIST OF ABBREVIATION

Abbreviations	
UV	Ultra violet
Ph	Potential of hydrogen
HIB	Haemophilus influenza type b
HIT	Haemophilus influenza type t
ATEX	Atmospheres explosible
HXM	Alternate protocol selection menu for all users
bpa	Bisphenol-A
DFP	Dwi Function Platform

CHAPTER ONE

INTRODUCTION

1.1 Research Background

A food dehydrator is a kitchen equipment that is used to extract moisture from different kinds of foods in order to prolong its shelf life. It is a cost-effective method to prepare and store fresh food in the comfort of your own home. The process of food dehydration offers a lot of benefits. It allows the preservation of seasonal food so that it can be made available throughout the year. It also makes it possible to store a significant amount of food in a small space. Some also view food dehydration as a fun and exciting hobby to take on. Another benefit of drying food is on its nutritional value. When food is cooked, some of its vitamins and nutrients are lost. However, eating raw dried food will ensure that you get all of its sweet rewards. Some dried foods are also stored to be rehydrated and consumed at a future time.

Food dehydration is the process of preserving and extending the shelf life of foods. Heat and air sources are used to remove the water content of foods which then prevents the growth and spread of bacteria. Basically, the goal is to eliminate moisture by using heat like electric or solar to dehydrate foods. Over the years, there have been inventions which included more sophisticated components that allowed the dehydration process to be more effective and efficient.

Food dehydrators come in two types: shelf and stacking dehydrators. A shelf dehydrator is exactly as its name suggests; it comes with several food trays positioned much like shelves to allow for ease of access and an even and simultaneous airflow. On the other hand, a stacking dehydrator consists of about four to 10 trays stacked on top of each other, where the source of heated air is either on top or at the bottom of the unit.

The modern ways of preservation are more predictable than the traditional ones since they have a consistent source of heat and temperature which are also evenly distributed, thanks to technology. The process of drying or dehydration makes the exterior hard, and so it serves as a shell not allowing bacteria to get

in. There are different components of a dehydrator, and most of them include food trays, air vents, fans, and a heating element. Moisture is released into the dehydrator when the food is heated, and they get pushed to the vents by the fan to be released outside of the dehydrator.

Trays come in different designs and sizes which can be stacked or removed. There are types of dehydrators with multiple levels which can be adjusted or rotated to allow changes in ventilation and to accommodate different sizes of food to be dried simultaneously. There are types of dehydrators which offer uniform drying, and there are types where you can place some foods near the source of heat if they require more temperature for drying. Some trays are circular, and they automatically rotate while dehydration is being done.

The temperature depends on what food needs to be dehydrated. Meats will require a higher temperature in order to prevent the growth of bacteria compared to vegetables and fruits. It is very critical that the temperature is monitored because the food may have moist interiors and dry exteriors if heat will not be consistent or evenly distributed.

Regulators allow to set temperatures accurately and a manual or a guidebook is provided so it can determine what temperature is necessary on specific foods. Dehydration may not be successful if do not follow the recommended temperature level on certain foods, so make sure to consider this very critical part.

In order to remove the moisture content on foods, the heat needs to be released through a heating element. The duration of this dehydration process completely depends on the type of food being dehydrated—it could take minutes or even hours. Most of the units are transparent so you can easily check and monitor the foods. Some have built-in timers which automatically turns off once the process is complete. The fans are strategically situated at the top or at the back of the dehydrator for proper heat and air movement. They function as regulators of temperature too. The heat is blown inside the dehydrator by its fans in order to remove the moisture which is then sent out through the vents.

Some of the fruits which are commonly dehydrated are those we add on cereals or bread, and they are cherries, cranberries, pineapple, apricots, apples, grapes, bananas, and plums. Meanwhile, we usually add dried vegetables to

soups or other snacks, and they include root vegetables, potatoes, mushrooms, peppers, herbs, and chilis. Jerkies are those dried meats with seasonings like turkey, venison, beef, and buffalo. Dehydrated fruits are dry and leathery while vegetables may be tough and crunchy. Jerkies, on the other hand, can have chewy, leathery, and tough texture. These are the expected outcomes which you will achieve if the process is done correctly. Unlike ovens and microwaves, dehydrators have been designed with a proper ventilation system which allows the exchange of moist and dry air to take effect through its components which ensures the removal of moisture from foods.

1.2 Problem Statement

The problem statement identified in this research is the problem of the method used in food drying activities. A significant problem can be seen is the problem of erratic weather. This is because, erratic weather can affect food drying activities. For example, when the weather It is not good for the food to be dried, it is not well dried, that is, the water in the food cannot be removed.



Figure 1.1 dehydration using sunlight .

Direct sun – UV radiation can damage food

Indirect sun – more complex and expensive than direct sun

Mixed mode – UV radiation can damage food and more complex and expensive than direct sun

Hybrid – expensive and it may cause fuel dependence

Quality of products are not obtained in some cases

This machine is also created as a result of problems such as the life span of a food is not long. So, from this problem, the machine created can dry food and can increase the life of a food. For example, fresh fruits that are not dried can maintain the freshness of fruit within 2-3 days at the right temperature. So, with this machine the fruits can be dried and can be stored for a long life. This can happen due to less bacteria breeding in dry areas. For safer, food will be placed in an airtight container to increase the shelf life of the food.

In addition, the problem that can be identified is the problem of storage space. If fresh food that is not dried, the food should be taken care of neatly. For example, fresh fruit should be placed in a cool space. The correct temperature chamber. Therefore, this problem can be solved if the fruit is dried and then stored in an airtight container. Dried fruit is more durable than fresh fruit that is not dried. So with this machine, we will be far from wasting.

1.3 Objective

This study has the following objectives :

- The dehydration food more taste great.
- Reduce food waste and extend shelf life.
- Create healthy and 100% natural foods.
- Dehydration can saving a cost.
- Efficient storing .
- Simple and easy to use.
- Safe preservation and very low risk of bacteria and spoiling.

1.4 Scope Of Study

This project is done by yourself with group members at home to ensure the successful testing of a dehydration machine runs smoothly. The scope of the study will involve the process of collecting data and information related to the drying of a food involving fruit. The information such as the thickness of the fruit and the weight of a fruit are also taken into account in an effort to ensure the effectiveness of the food drying process using machines. Parameters such as the data area of a piece of fruit, the data of the weight of a fruit either weekly or monthly will be taken into account

In addition, to determine the strength and stability of a food drying machine, this study will test the maximum number of temperatures and time that can be taken when conducting the experiment

Next, this project uses quality ingredients to ensure the drying of a food can run smoothly. In addition, to ensure that the fruits can be dried properly, each member of the group takes every hour to see the food drying properly dried.

1.5 Significance Of The Study

In general, food dehydration is interpreted as the removal of moisture from a food product. In order to distinguish this process from evaporation as described in the previous chapter, additional specifications related to characteristics of the final product are usually required. The objectives of dehydration as applied to food products, probably the most evident being to preserve the product during prolonged storage. The dehydration process meets this objective by reducing the moisture content of the product to levels which are adequate to limit microbial growth or other reactions. In addition, reduction of the moisture content results in preservation of quality characteristics such as flavor and nutritive value. Another objective of dehydration is the significant reduction in product volume, which promotes efficiency in both transportation and storage of the important components of the food product. The somewhat less evident objective in dehydration is to provide or manufacture a product which is convenient to use—a factor which may not have reached its full potential as yet.

Using a food dehydrator to remove moisture from food items such as fruits, vegetables and meats, creates naturally concentrated, rich and delicious tasting food. Not only that, but when making food yourself, you know the quality and freshness of the produce you are using - unlike when eating dehydrated foods purchased from the grocery store.

Dehydrating foods requires only one ingredient, the food its drying, so not only is it 100% natural, but the benefit from all the minerals and fibre of the whole fruit, and unlike cooking and steaming, they don't lose any of the nutritional content of the foods are dehydrating.

Dehydrating will change the way when look at foods. Simple fruits and vegetables can be transformed into delicious, healthy snacks and treats. Healthy alternatives to junk foods can be made in a dehydrator and the possibilities are literally endless! You will probably be surprised at the amount of foods which you consume which are actually dried and you can make yourself - sultanas, dried herbs, dates etc.

When it think of dried fruit, tend to associate it with a "healthy snack" and a lot of the time when people are dieting they consume large quantities of dried fruit thinking it is a healthy alternative to sweets or lollies. However, this is not the case when it comes to store-bought dried fruit. Many store-bought dried fruits contain added sugars, sulfur dioxide and trans fat - all of which can be harmful to people. Sulfur dioxide is sometimes added to store bought dried fruit in order to prevent discolouration. Sulfur dioxide can cause asthma, skin rashes and stomach pains. Sulfur dioxide is particularly present in dried apricots, which is what gives them the bright orange colour.

By making own dried fruits, there is no additives or preservatives - there are in control of what goes into your food! If people are tired of not being able to give their children and family healthy snacks, a food dehydrator is the answer.

Dried foods take less than one sixth of their original storage space and don't require the ongoing electrical drain of a refrigerator or freezer. Simply pack the foods clean, dry, insect proof containers or canning jars, plastic freezer containers with tight fitting lids, plastic freezer bags or vacuum seal bags (in single portion sizes) and store them in your pantry for the perfect go-to snack.

This significant reduction in size means that you can fit a lot of preserves into a small area - which is especially ideal for camping, trekking and large families.

So simple and easy to use, food dehydrators are essentially fool-proof. With the straightforward set and forget system, the simply prepare the food by slicing into pieces, pop onto the trays, set a timer and walk away. It's that easy.

1.6 Summary Chapter

Nowadays, the issue of natural drying using sunlight is very common because people now do not know about drying food using more efficient and faster machines. Overall in this chapter such as study background, problem statement, study objectives, study scope and importance of the study have been discussed to address the issue of drying using sunlight to the use of more sophisticated machines.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review is a study conducted based on true theories and applied in fields related to research such as journals, articles, books and newspaper studies. Therefore, in this chapter some theories related to this study will be presented such as stainless steel, blower and other materials.

2.2 Overview of stainless steel

Initially, the first few stainless steels came from several artifacts that could survive from ancient times. In this artifact no chromium content is found, but it is known, that what makes this metal artifact stainless is the amount of phosphorus substances it contains which together with local weather conditions form a stable layer of oxide and phosphate. Meanwhile, the alloy of iron and chrome as a stainless material was first discovered by the French-born metallurgist, Pierre Berthier in 1821, which was later applied to cutting tools, such as knives. Then in the late 1890s, Hans Goldschmidt of Germany developed an aluminothermic process to produce carbon-free chromium.

In 1904-1911, Leon Guillet successfully combined in some of his research which is now known as Stainless Steel but there are still some weaknesses. In 1912, Harry Brearley did research on rifle barrel corrosion. The problem is that the fertilizer on the barrel of the rifle is not heat resistant. Brearley began testing the addition of a certain amount of chromium to the steel and from the results of the experiment obtained an addition of chromium as much as 12-14% so that the steel can be stainless. Brearley saw the possibility of this material being commercialized as kitchen utensils and eventually named his invention with stainless steel. On August 13, 1913, the first stainless steel was produced in the Brown-Firth laboratory and in 1916 Brearley obtained a patent for this invention in the United States and several European countries.

Advantages of stainless steel sus304

- Corrosion Resistance – Chromium is the alloying element that imparts to Stainless Steel their corrosion resistant qualities. Lower alloyed grades resist corrosion in atmospheric and pure water environments; high-alloyed grades can resist corrosion in most acids, alkaline solutions, and chlorine bearing environments making their properties useful in process plants.
- Fire and Heat Resistance – Special high chromium and nickel-alloyed grades resist scaling and retain high strength at high temperatures. Stainless Steel is used extensively in heat exchangers, super-heaters, boilers, feed water heaters, valves, and main stream lines as well as aircraft and aerospace applications.
- Hygiene – Cleanliness is a matter of high importance. The easy cleaning ability of stainless makes it the first choice for strict hygiene conditions, such as hospitals, kitchens and food processing plants.
- Aesthetic Appearance – The bright easily maintained surface of stainless steel provides a modern and attractive appearance.
- Strength-to-Weight Advantage – The work hardening property of austenitic grades, that results in a significant strengthening of the material from cold working alone, and the high strength duplex grades, allow reduced material thickness over conventional grades yielding considerable cost savings.
- Ease of Fabrication – Modern steel-making techniques mean that stainless can be cut welded, bent, formed, machined, assembled and fabricated as readily as traditional steels.
- Impact Resistance – The austenitic microstructure of the 300 series provides high toughness at elevated temperatures ranging far below freezing, making these steels particularly suited to cryogenic applications.
- Long-Term Value – In considering total cost, it is appropriate to consider material and production cost AND the life cycle cost. When the total life cycle costs are considered, stainless is often the least expensive material option. The cost saving benefit of a maintenance free product having a long life expectancy.
- 100 % Recyclable – Over 50% of new stainless comes from old remelted stainless steel scrap, thereby completing the full life cycle

2.2.1 Austenitic Stainless Steel

Austenitic Stainless Steel contains at least 16% Chrom and 6% Nickel (standard grade for 304), up to Super Austenitic Stainless Steel grade such as 904L (with higher Chrom and Nickel levels and additional Mo elements up to 6%). Molybdenum (Mo), Titanium (Ti) or Copper (Co) work to increase resistance to temperature and corrosion. Austenitic is also suitable for low temperature applications because Nickel elements make Stainless Steel less brittle at low temperatures.

Non-magnetic, in annealed condition, can not be hardened by heat treatment, can be hot-worked and cold-work, has high shock resistant, difficult to machine except with the addition of S or Se, corrosion resistance is best among other types, strength at high temperatures and excellent scaling resistance.

2.2.2 Ferritic Stainless Steel

Chrom rates vary between 10.5 - 18% like grades 430 and 409. Corrosion resistance is not very special and is relatively difficult to fabricate / machining. But this deficiency has been improved at grades 434 and 444 and specifically at grade 3Cr12.

Magnetic, can not be hardened by heat treatment but can be hardened by cold work, can be cold work or hot work, in the condition of annealed tenacity and the highest corrosion resistance, strength reaches 50% higher than in plain carbon steel, corrosion resistance and machinability are better from Martensitic stainless steel.

2.2.3 Martensitic Stainless Steel

Stainless Steel this type has the main element of Chrom (still less than Ferritic Stainless Steel) and relatively high carbon levels such as grades 410 and 416. Grade 431 has Chrom up to 16% but the microstructure is still martensitic because it has only Nickel 2% .Grade Stainless Steel others such as 17-4PH / 630 have the highest tensile strength compared to other Stainless Steel. The advantage of this grade, if higher strength is needed then it can be hardening.

Element	Weight percentage
Carbon	0.08 max
Manganese	2.00 max
Phosphorus	0.045 max
Sulphur	0.030 max
Silicon	0.75 max
Chromium	18.00-20.00
Nickel	8.00-12.00
Nitrogen	0.10 max
Iron	67-71

Mechanical properties of grade SUS304

Assortment	Yield point or Proof stress	Tensile strength	Elongation	Reduction of area	Charpy impact strength
-	N/mm ²	N/mm ²	%	%	J/cm ²
Plate/Sheet Hot-rolled	205	520	40		

Hardness of grade SUS304

-	Brinell HBW / HB	Rockwell C HRC	Rockwell B HRBS / HRB	Vickers HV
SUS304 Hot-rolled	187		90	200

2.2.4 Duplex Stainless Steel

Stainless Steel Duplexes such as 2304 and 2205 (the first two digits indicate the percentage of Chrom and the last two digits indicate the percentage of Nickel) have a mixed microstructure of austenitic and Ferritic. Ferritic-austenitic duplex has a combination of corrosion-resistant properties and relatively high temperatures or is particularly resistant to Stress Corrosion Cracking.

Although its Stress Corrosion Cracking ability is not as good as ferritic Stainless Steel but its toughness is much better (superior) than ferritic Stainless Steel and worse than Austenitic Stainless Steel. While its strength is better than Austenitic Stainless Steel (which is annealing) about 2 times. In addition, Duplex Stainless Steel corrosion resistance is slightly better than 304 and 316 but resistance to pitting corrosion is much better (superior) than 316. Its toughness Duplex Stainless Steel will decrease at temperatures below - 50 oC and above 300 oC.

2.2.5 Precipitation Hardening Steel

Precipitation hardening Stainless Steel is stainless steel that is hard and strong due to the formation of a precipitate (sediment) in the metal microstructure. So that the deformation movement is hampered and strengthens the Stainless Steel material. This formation is caused by the addition of the elements copper (Cu), Titanium (Ti), Niobium (Nb) and aluminum. The strengthening process generally occurs during cold work. Precipitation hardened stainless steel, easy to manufacture, high strength, good corrosion resistance.

2.3 Blower Fan Performance Evaluation and Efficient System Operation (HIB-P/HIT-P)

Blowers Fan provide air for ventilation and industrial process requirements. Fans generate a pressure to move air (or gases) against a resistance caused by ducts, dampers, or other components in a fan system. The fan rotor receives energy from a rotating shaft and transmits it to the air. Wall mounted axial flow fans with galvanised steel sheet structure, outlet louvre shutter with mechanical opening, inlet guard from galvanised steel and belt driven impeller from aluminium sheet (except Ø 800 direct driven models), powered by single phase (HIB) or three phase (HIT) motor. IP55, Class F.

Motors

Electrical supplies:

Single phase 230V-50/60Hz.

Three phase 230/400V-50/60Hz.

High-efficiency IE3 motors for three-phase models fitted with 1,1kW and 1,5kW motors.

On request 60 Hz models and models without shade, with defense on the discharge side can be supplied.

Advantages of Blower Fan

- High energy efficiency; they have constant air flow delivery that enable them generate energy of up to 84% efficiency. Increased efficiency is important for maintenance of bigger air systems.
- They are durable and hence able to operate in areas where corrosion can occur.
- Certain systems can be manufactured to restrict overloading. This prevents the motor from possible damages when overloading occurs.
- They are easier to carry out maintenance, while others have self cleaning characteristics.
- Greater versatility. They can operate in wider range of environments and diverse air flow conditions.
- They can be manufactured in various sizes and thus able to accommodate different applications like those in enclosed places and areas difficult to access.

2.3.1 Other types of Blower Fan

1. HXBR/HXTR

Plate mounted axial flow fans manufactured from high grade galvanised steel and provided with a Sickle blade impeller, low sound level, protected against corrosion by cataforesis primer and a polyester black paint finish (1), single phase external rotor motor (HXBR) or three phase motor (HXTR), IP44 (models 250 to 355) or IP54 (models 400 to 800), Class F, equipped with thermal protection and terminal box with capacitor incorporated in single phase models. Model 800: impeller motor unpainted.

Motors

Available in 2, 4, 6, 8 or 12 poles, depending on versions.

Electrical supplies:

Single phase 230V-50Hz

Three phase 400V-50Hz

230/400V-50Hz (models 250)

Three phase motors suitable for inverter control.

(See characteristics chart).

Additional information

Standard air direction: form (A) configuration (motor over impeller).

Three phase motors 230/400V-50Hz

2. HDB/HDT

Range of plate mounted axial flameproof fans. Mounting plate manufactured from galvanised sheet steel fitted with an internal aluminium ring and motor support manufactured from heavy gauge aluminium sheet. The whole assembly is protected by aluminium paint finish B-0920. Impellers manufactured from one piece die-cast aluminium with aerofoil profile fixed blades and finished in a high temperature paint coating (red colour).

Available, depending upon the model, with single or three phase motors in 4, 6 or 8 poles.

Motors

All motors are IP55, Class F insulation.

All motors incorporate ball bearings greased for life.

Electrical supplies:

Single phase 230V-50Hz.

Three phase 230/400V-50Hz.

Additional information

For the single phase motors, the capacitor is provided not fitted on the fan.

It must be installed outside of the ATEX area or within an electrical main board complying with ATEX Directive.

Air direction: form (B) configuration (Impeller over Motor) only for 450 and 560 models.

3. HXM

The HXM plate mounted axial flow fans are manufactured from pressed galvanised steel and protected from corrosion by a beige epoxy-polyester paint finish. HXM models include impellers manufactured from aluminium sheet (HXM-200 to HXM-350) or steel sheet (HXM-400), finished with black polyester paint.

All models include a steel finger proof guard as standard mounted to the inlet side of the fan.

Motor

HXM-200 to HXM-350: Single phase speed controllable motor 230V-50/60Hz equipped with thermal protection, IP44, Class B insulation, flexible cable (length: 50cm) for connection to the electrical supplies and ball bearings greased for life.

HXM-400: External rotor motor, IP54, Class F insulation, fitted with thermal protection and wiring terminal box.

Additional Information

Standard air direction: form (A) configuration (Motor over Impeller).

2.4 Overview Of Manufacturing Stainless Steel Tray

Nowadays, stainless steel has become the most commonly used material in the market. It is also meant to be a professional as well as expensive material as compared to the plastic. Well, this is also true that if any one of us gets an option to buy a long-lasting, healthy (BPA free) and reliable dehydrator, then we will opt for the stainless steel food dehydrator with stainless steel shelves appliance for sure.

Stainless steel dehydrators have several benefits like its durability, enduring existence and you can also expose it to the high temperature for the longer time duration. Its trays remain in shape even after prolonged contact towards the heat. The looks and appearances of the stainless steel dehydrators make your kitchen look modern too.

The fifth name in our list is of the Excalibur 6-Tray w/Stainless Steel Trays, Model D900CDSHD which is one of the finest dehydrators. It possesses a sleek design along with a stainless steel door as well as a stainless steel build. It will find it quite attractive and it will surely give our kitchen an excellent, elegant appearance. As we know that Excalibur is known for high-quality products. It comprises of a six tray row which makes it very efficient while drying process.

Stainless steel wire mesh are the same think for stainless steel tray is a type of wire product that is utilized in a number of applications. The mesh may include a very fine weave or one that is somewhat open, depending on the type of function the product is designed to fulfill. Sometimes known as Dutch wire cloth, most forms of the mesh are designed to be easy to trim for specific uses while also providing a reasonable level of durability.

The uses of stainless steel wire mesh often focus on situations in which there is a need to maintain some degree of visibility once the mesh is in position. Owing to the weave of the mesh, it is possible to use the product in

food dehydrator machine. At the same time, the mesh does not inhibit the ability to check inventory levels when and as needed.

Along with visibility, stainless steel wire mesh also provides the ability to allow for airflow in any area where the mesh is installed. Depending on the pattern, there may be little to no impedance in the flow of air at all. This can be important on a production floor when there is a need to allow the air to freely circulate in order to keep machinery at a constant temperature.

The fineness of the pattern found on the stainless steel wire mesh can also help to reduce the distribution of airborne elements, especially in textile plants. This can help to reduce contamination when different lots and merges of fibers or materials are in production on food dehydrator machine. A fine pattern can easily capture any off-fly that may develop during the fiber processing, not allowing the airborne elements to be trapped in the spinning or twisting of fibers on nearby machine frames. The end result is that the strategic placement of the stainless steel wire mesh helps to minimize the production of second quality goods..

Stainless steel wire mesh can also be used in the creation of goods for use in the home and even in municipal and commercial buildings. It is not unusual for the mesh to be utilized in the manufacture of screens that are placed around fireplaces, or to provide caps for chimneys. In building construction, the mesh can be installed over insulation sheeting, helping to secure the sheets into position and reduce the potential to damage or shifting of those sheets. While durable, the mesh can easily be cut to fit any application, using nothing more complicated than a pair of wire cutters.

Advantages of stainless steel tray

corrosion-resistant properties of stainless steel tray

Stainless steel medical trays have a longer lifespan than plastic due to their corrosive-resistant properties as well. While stainless steel resists corrosion in atmospheric and pure water environments, high-alloyed steel grades also resist corrosion from most acids, alkaline solutions, and chlorine environments. In contrast, most plastics cannot last long in caustic environments and have very limited corrosion resistance overall.

The ability to resist caustic is essential for medical trays since bodily fluids and medical solvents are corrosives. While generic stainless steel can resist contact with corrosives such as body fluids, stainless steel tray is especially resistant to chlorides that would damage regular steel. In comparison with plastic or cheaper metals such as aluminum, steel trays are stronger and are more resistant to damage from an accidental drop

Stainless steel tray is highly corrosion-resistant, allowing it to be frequently used with corrosive chemicals, such as blood, salt, and cleaning agents, without damage to its structural integrity. When compared to a polymer medical tray, stainless steel is better at handling damage from drops, resisting scratches, and takes high temperatures far better. In fact, even the softest of stainless steel alloys tend to be many times stronger than even the strongest plastics.

Additionally, the naturally sterile nature of stainless steel and the sterility of electropolishing, make this high-quality metal an ideal option for medical applications. While some plastic may absorb some contaminants, steel is non-absorbent so there is no risk of spreading bacteria or toxins.

2.5 Summary Chapter

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 stainless steel, blower fans and tray identified its function. This implementation can determine the materials that will be used to perfect the food drying machine

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this world surrounded by advances in science and technology, various tools are used to facilitate and expedite work. preparing food. Especially wet foods that need proper storage. For example, fruits are foods that need to be stored at the right temperature that is at a temperature that is not too low and not too high. The fruit will be affected in terms of nutrition and taste. In addition to fruits, this versatile food dryer can also be used for other foods.

Among them, seafood to be dried. Usually the fish to be dried will take a long time. Therefore, with this food dryer, one does not have to worry about drying the fish without having to make predictions for the day. This is because, the main factor for drying fish is the weather. If the weather on that day is not good, the food drying process cannot be done because the drying process requires sunlight to remove water from the food.

Therefore, this multipurpose food dryer is very useful and it is recommended that every home has a multipurpose food dryer to facilitate daily work without having to think about weather problems. In addition, there are many advantages to using this versatile food dryer. stored for a longer period of time. This is because, the food that has been dried will be avoided from water where water is one of the main factors bacteria can spoil food. Therefore, dried food should not be stored in the refrigerator. the dry ones only need to be stored in an airtight container and can enjoy food at any time.

3.2 Methodology Flow Chart

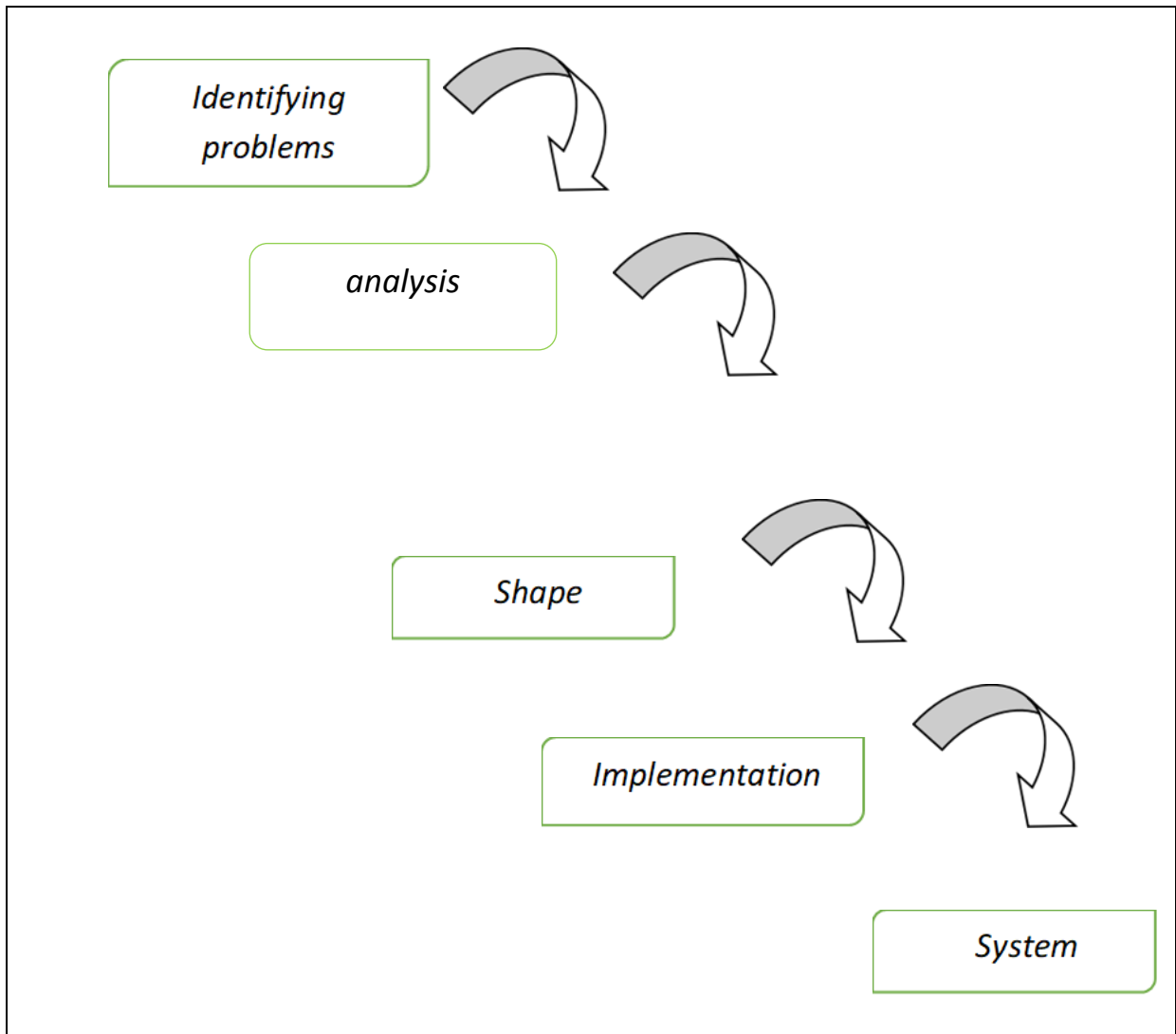


Figure 3.2: Methodology Flow Chart (Waterfall)

Identifying Problem

The problem statement identified in this research is the problem of the method used in food drying activities. A significant problem can be seen is the problem of erratic weather. This is because, erratic weather can affect food drying activities. For example, when the weather is not good to dry food that is not well dried, that is, the water in the food can not be removed. When water can not be removed as desired, it can no longer increase the life of a food but food is more easily infected and causes damage.

This machine is also created as a result of problems such as the lifespan of a food is not long. So, from this problem, the machine created can dry food and can increase the life of a food. For example, fresh fruits that are not dried can maintain the freshness of fruit within 2-3 days at the right temperature. So, with this machine the fruits can be dried and can be stored for a long life. This can happen due to less bacteria breeding in dry areas. For safer, food will be placed in an airtight container to increase the shelf life of the food.

In addition, the problem that can be identified is the problem of storage space. If fresh food is not dried, the food should be taken care of neatly. For example, fresh fruits should be placed in a cool space. Fruits will be bad if not placed on the right temperature space. Therefore, this problem can be solved if the fruit is dried and then stored in an airtight container. Dried fruit is more durable than fresh fruit that is not dried. So with this machine, we will be far from the attitude wasting.

Analysis

The data obtained were collected, processed and analyzed to enable the next steps to be taken and the determination of the study to be done as required in the objectives.

Shape

Before a food drying machine is implemented, the drying system is done manually and there is no fixed design. The design we have created by taking into account various aspects including, the type of steel that is safe and suitable for nutrition and harmless and by using steel & along with thermal insulation this design is safer to use because when the machine is processing the user is not injured.

Implementation

When a machine is ready to be built, the machine should be tested on food to find out whether it is dry or otherwise for drying food so that the food lasts longer. Furthermore, the use of this food drying machine can also help traders who use a manual drying system to this machine without worrying about the weather.

System

Once the Dwi Function Platform (DFP) has successfully achieved the desired objectives, the product will be placed in the village area for traders for drying food such as fish, fruits and so on for sale.

3.3 Methods

To carry out this study, there are data collection methods have been practiced to obtain data that are important for the level of analysis. Among the data collection methods is the questionnaire method. Data collection can be classified into two types, namely primary data and secondary data.

3.3.1 Primary Data

Primary data are important data in the study. Without key data, the objectives of the study will not be achieved. The data collection process is done through the distribution of questionnaires to respondents. Therefore, a total of 351 respondents were randomly selected.

3.3.2 Secondary Data

Secondary data consists of literature review and other sources such as theses, books related to the field of study, local newspapers, journals and other publications related to the study conducted. These materials are analyzed according to their suitability and form the basis of reference for this study.

3.4. Quantitative Analysis

For quantitative analysis, the data collected must have a uniform distribution. It aims to ensure that there are no extreme values that will cause bias (bias) and inaccuracies in the analysis. To conduct this analysis

3.5 Benefits Of Food Dehydrator

Dehydrated foods taste great. Using a food dehydrator to remove moisture from food items such as fruits, vegetables and meats, creates naturally concentrated, rich and delicious tasting food. Create healthy and 100% natural foods. Dehydrating foods requires only one ingredient, the food you're drying, so not only is it 100% natural, but you benefit from all the minerals and fibre of the whole fruit, and unlike cooking and steaming, you don't lose any of the nutritional content of the foods you are dehydrating.

Cost savings. Processed, store bought snacks can be expensive and organic dehydrated foods are often highly overpriced. You can save a lot of money by using your own food dehydrator and by purchasing fresh food items in bulk when in season, or by harvesting your own produce. Flexible and Versatile. Whether you want to make fruit leathers, activate some nuts or make a batch of veggie chips, food dehydrators provide you the flexibility to do all of it - plus you have the option to run the machine for a period of hours, or over a number of days.

Efficient Storing. Dried foods take less than one sixth of their original storage space and don't require the ongoing electrical drain of a refrigerator or freezer. Simply pack the foods clean, dry, insect proof containers or canning jars, plastic freezer containers with tight fitting lids, plastic freezer bags or vacuum seal bags (in single portion sizes) and store them in your pantry for the perfect go-to snack.

3.6 How To Dry Food Your Food

Dehydrating fruits.

Sliced apples on dehydrating tray For the best dried fruit, choose high quality produce that was picked when ripe. Ripe fruit is at its peak sugar content, which means sweeter snacks. But watch for anything overripe or bruised: these may turn black while drying.

Wash skins if you're planning to leave them on, then core or pit (if required) and slice to an even thickness. Place on dehydrating trays and dry at 135 to 145 F until pliable. For fruits like apples, bananas, peaches, and nectarines, drying times will range from 6 to 16 hours. Apricots, grapes, figs, and pears can take anywhere between 20 to 36 hours. Check every 2 to 3 hours within those ranges, rotating trays if necessary.

Don't add new fruit to your dehydrator if an old batch is still in the works: this will cause partially dried fruit to absorb moisture.

Dehydrating vegetables.

kale and Swiss chard on dehydrator tray Vegetables dry more quickly than fruits, but they also spoil more quickly. Take care when preparing and do everything you can to preserve their freshness before drying. That includes storing in the fridge or on produce-saving paper, only preparing as much as you can handle in one load, and washing in cold water.

Remove any tough pieces of skin or stem, cutting away bruises and spots. Slice to an even thickness using a food processor or spiralizer. Choose smaller lengths over larger ones to speed drying. Blanch where necessary (as noted

above). Place on dehydrator trays without overlapping and dry at 125 F. Tomatoes and onions are the exception and are best dried at 145 F. Drying times will range from 4 to 10 hours depending on the vegetable and size of your pieces. If possible, don't dry strong smelling vegetables at the same time as the milder smelling varieties. Brussels sprouts, onions, peppers, and garlic will leave their signature scent in other foods.

How to dehydrate meat and fish.

Cooked turkey on drying racks Choose only fresh, lean meat and low-fat varieties of fish for drying, since fat will spoil quickly. Don't dehydrate pork, unless you're using sliced, cured ham. When dehydrating cooked meat, remove fat and cut into cubes about ½ inch. Spread on trays and dry at 145 F. Most cooked meats will take between 6 and 12 hours to dry fully. Pat dry if any oil surfaces during the dehydration process. You can also dehydrate (cooked) ground beef in the same way.

To make jerkies for snacks and camping trips, you'll need to cut meat into thin, uniform strips. Next, marinate in brine or dry cure using a salty "rub" for 6 to 12 hours in the refrigerator. Once cured, brush off the strips and dehydrate at 160 F. Reduce to 145 F until strips crack (but don't break) when bent.

Dehydrating nuts and seeds

Drying soaked sunflower seeds Why would anyone dehydrate nuts and seeds when they're already tasty raw? Some people with digestive issues find that soaking and dehydrating nuts and seeds make them easier to handle. That's because raw nuts contain enzyme inhibitors. Soaking helps break down these inhibitors, making nuts and seeds more digestible.

To prepare nuts for dehydrating, soak overnight in a solution of salt and water (about 1 tablespoon sea salt to 4 cups of nuts covered in water). Drain and spread in a single layer on dehydrator trays. Dry at 145 F for 12 to 24 hours.

This recipe works well for cashews, almonds, pecans, walnuts, and pumpkin seeds.

Dehydrating herbs

Drying herbs Herbs are one of the easiest and quickest foods to dry. There's little preparation and they store for a long time without losing their flavor.

Harvest your favorite herbs in the morning, preferably earlier in the year before flowers bloom. If it is seeds you're after, such as coriander and celery, gather on a dry day when the sun is out. Snip into single-stem lengths, gather in a bundle, and hang in the shade. Or arrange on dehydrator trays in a single layer and dry at 95 to 105 F for 2 to 4 hours. Herbs that have finished drying will be brittle and crumble easily when touched.

3.7 How Does A Dehydrator Work?

So, how does a dehydrator work? A dehydrator is an electrical machine that removes the moisture content of whatever is inside. It is comprised of trays, heating elements, vents, and a fan for circulation. The dehydrator's heating element raises the temperature inside the machine, the fan evenly circulates the heat and removes the moisture, while the trays hold the food you wish to dehydrate.

Of course, many details go into the actual use of a dehydrator. You can't just cut your food up, throw them into the machine, close the door, and say "work!" Those details can be intimidating too.

Dehydrators have a scale of temperature to use, and you need to learn which temperatures are most appropriate for each food. There are timetables for how to get the perfect dehydration of your specific food. Then, there are plenty of dehydration machines out there on the market, so you need to know what to look for and what you want to avoid while on the prowl.

3.8 How Long Will Dehydrated Food Last?

While dried food has been known to last five to ten years if prepared and stored correctly, it's best to use yours between 4 months and one year.

3.8.1 Temperature ranges for dehydrating in the oven or dehydrator:

Fruit / Fruit Leather: 50°C – 60°C / 120°F – 140°F

Vegetables: 50°C – 60°C / 120°F – 140°F

Meat: 60°C – 70°C / 140°F – 160°F

3.9 Types Of Food Dehydrating

There are a few ways to go about dehydrating your food, but some methods are more successful than others. That's because modern tools have helped improve the rate of dehydration, reducing the chance your food will spoil. Here are the most common methods used today.

Sun drying.

It's hard to think of an older or simpler way to preserve food than sun drying. For about 12,000 years people have sliced fruit and placed it on racks or lines in the sunshine. Sun drying is very effective in places with long periods of hot sun. The ancient Romans commonly ate raisins and dried figs thanks to their Mediterranean climate. But anywhere with a minimum temperature of 86 F and a relative humidity of 60% will work. Just remember that fruit takes several days to dry thoroughly. Place on a mesh screen—avoiding anything galvanized—and cover with a second screen to deter flies and other insects.

Air drying.

Like sun drying, air drying is an ancient method of dehydrating food. The main difference is that air drying usually takes place in the shade. That's because this method helps preserves anything that needs protection from the sun's rays. It works well for delicate greens and herbs—especially those you're saving for culinary mixes or herbal teas.

Solar drying.

A step up from sun drying, solar drying uses a dehydrator powered by the sun to passively dry your food. Since there's no element to provide heat or fans to circulate the air, solar drying uses no electricity. Solar dryers work outdoors and are usually designed like a mini tabletop greenhouse.

Oven drying.

Oven drying uses your home oven to slowly dry food at temperatures around 140 F. Because ovens are so large, they're not the most efficient dryers on the block. But they can save you the trouble of buying an extra appliance if quick drying is your goal. They can also warm up your house, since you'll need to prop the door open to let the moisture escape. If you're thinking of drying food in your oven, check to make sure your oven goes low enough. Anything over 140 F will cook your food instead of drying it.

Electric dehydrating.

Add modern technology to age-old drying techniques and presto: you have electric dehydrators. These little powerhouses come equipped with fans and elements to quickly and efficiently dry your food. That means virtually no spoilage and a tasty end result. Most electric dehydrators also come with a temperature gauge and adjustment dial. This helps to speed or slow drying time depending on what you're processing. If your food dehydrator does have a fan, consider using it in your garage or another area where noise won't matter. Applies if you're using your food dehydrator in summer and you don't want to heat up your living space.

3.10 How to Determine The Right Dehydrator Temperature

Most vegetables and fruits dehydrate well at between 125-135 degrees Fahrenheit. Don't be tempted to turn up the temperature to make the process go faster because this will create a tough outer skin with an inside that hasn't completely dried. In addition to this, raising the heat to high in your food dehydrator will kill off any enzymes in the food, and will cause it to lose its nutritional value. So it's important to know the proper temperatures to dehydrate your foods.

The instructions for your dehydrator will give the optimal time and temperature for a variety of fruits and vegetables. Some will even provide you with a quick and handy drying guide found right on the food dehydrator, like the one seen below on an Excalibur 3926TB Food Dehydrator . Overall, you'll find many resources online that recommend temperatures and drying times depending on the fruit or vegetable.

3.11 Tips For Successful Food Dehydration and Preservation

- Pick produce at its peak ripeness to get the most flavor, vitamins and nutrients.
- Buy the right dehydrator for your needs.
- Dehydrate fruits and vegetables that are in-season to save on costs.
- Use the right drying temperature for the food.
- Take steps to control the moisture content.
- Pack and store your dehydrated food according to these guidelines.

Dehydrated food will last for years if you follow the right steps when it comes to picking, preparing and drying it. A dehydrator is a good investment that will help you store food more compactly, and it's always a good idea to keep provisions on hand in case of emergencies. Not only that, drying food is an easy way to save money!

3.12 Food Dehydrator vs. Oven Drying Food

These two methods of dehydrating food are probably the most common ways people are recommended to dry food so that is why we are concentrating on these two. There are, of course, other methods of dry. Methods that have been used for thousands of years like air drying are still in use today. Drying herbs, for example, is best done by air drying because you lose less of the delicate aroma and flavour of the herbs. Sun drying is another method that is still in use with sun-dried tomatoes being the obvious candidate.

Of course, not every climate is suitable for a method such as sun-drying so that is where appliances like dehydrators come in. A dehydrator or even an oven are able to dry most foods that you want to preserve and there is a degree of control which means you can ensure the food is first of all safe to eat but also that you retain the flavour and taste that you want as well.

Dehydrating meat, for example, requires careful control of temperature to ensure the meat doesn't spoil before it is dried. A dehydrator can do this and so too can an oven so that is why we are going to compare these two methods.

3.12 Summary

In the initial stage, the study design, data collection methods, research instruments, data sampling techniques and data analysis methods are made systematically in the methodological study to know the facts and information to support the research instrument and describe more clearly in this study. After the data analysis is done, it is important to make a conclusion or conclusion on the results and hypotheses that is whether the drying of the food is effective or not.

CHAPTER FOUR

RESULT

4.1 Introduction

Once all the data and information are obtained, analysis is done to see the effectiveness of the Food Dehydrator that has been tried.

The results obtained in this chapter are the results obtained from the questionnaires and experiments that have been conducted. Data resulting from experiments in the study are analyzed in more detail to draw conclusions based on the objectives of the study that have been stated.

The study was conducted using respondents from PSA staff especially in mechanical department. There are several aspects that are the main focus for example:

- 1) Demographics of Respondents (gender and age)
- 2) General view of the study
- 3) Respondents' perspective on the Food Dehydrator:
 - i. Shape
 - ii. Function
 - iii. Materials used
 - iv. Advantage

4.2 Respondent Demography Profile

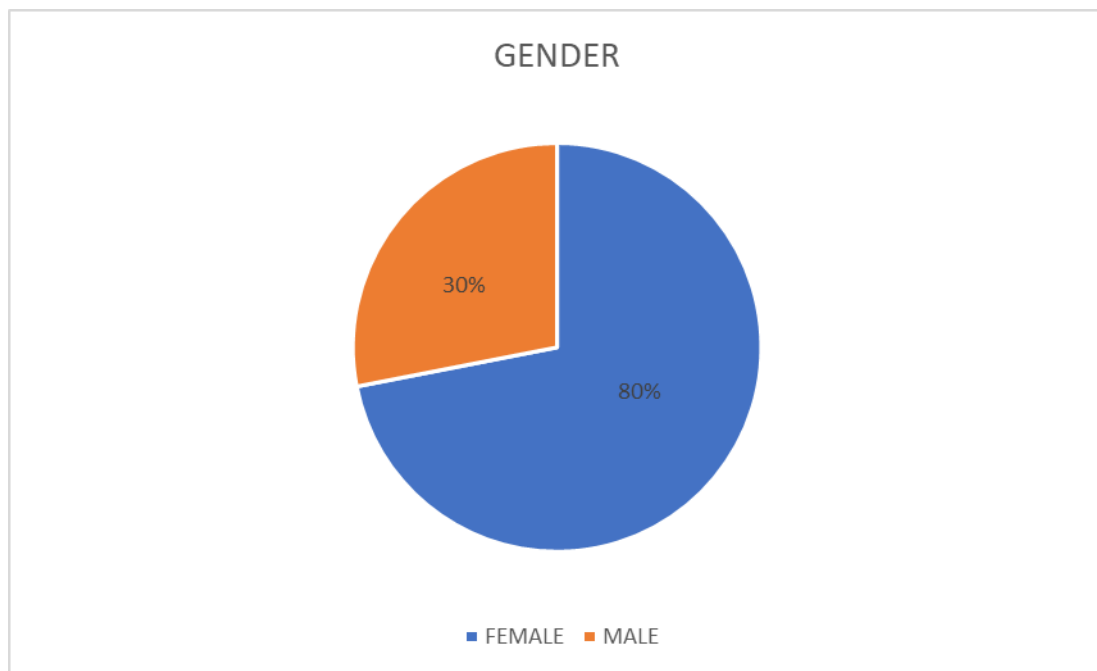
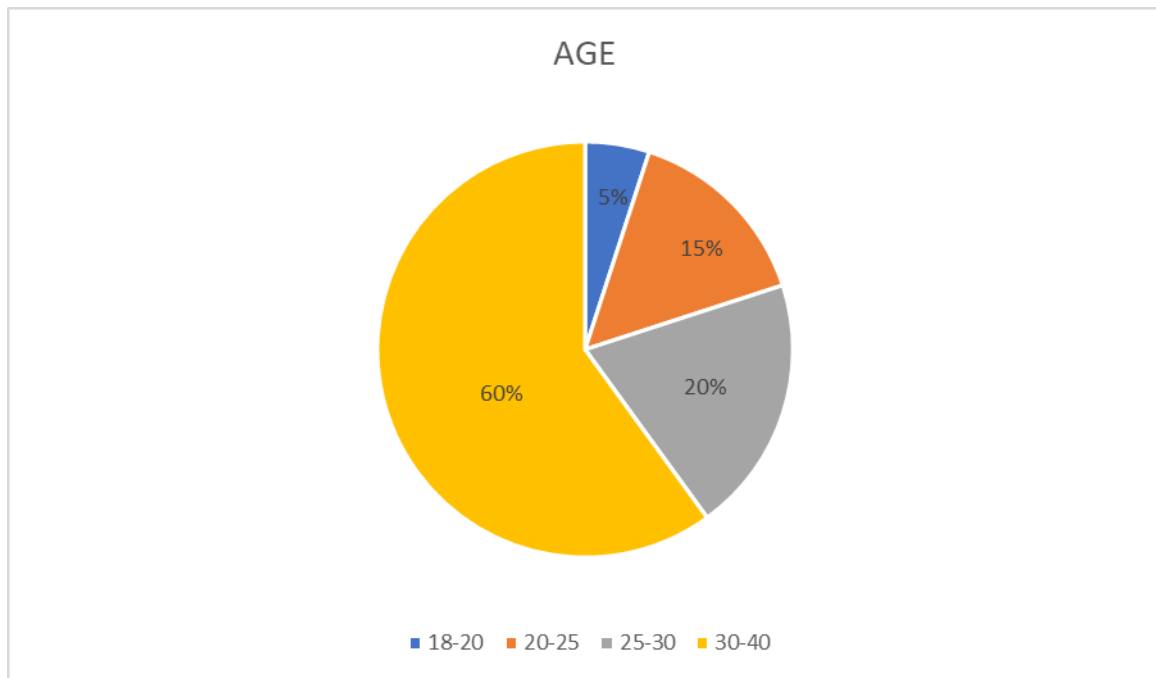


Figure 4.2.1 Gender of Respondent

This chart shown that the number of female sex is more than 80% compared to the male gender of 30%. It is clear that those who will use this machine are women. This shows that women prefer to cook than men.

In addition, women are also more creative to create a variety of new foods. Therefore, they are more attracted to this machine.



4.2.2 Age of respondent.

This chart shown that the total percentage of respondents aged 18 to 20 years is relatively small. This is because at this age they are categorized among students. So usually students will spend more time at school than at home.

For respondents aged 20 to 25 years, the percentage increased slightly compared to before. Usually at this age respondents will also be categorized as students. So they are still not interested in this machine.

Furthermore, respondents aged 25 to 30 years get a percentage of 20%. This clearly shows that the older the respondent, the more interested respondents are towards this food dryer.

And the last one is, the respondent who is 30-40 years old. They are usually who are no longer working, especially for women. They will be housewives and will spend a lot of time at home. So they become bored and get so many ideas to make a variety of food products. Therefore most of this age range will be more interested in buying this Food Dehydrator.

4.3 Component Cost

NO	COMPONENT	NUMBER OF COMPONENT	PRICE (PER UNIT)	TOTAL PRICE
1	Motor base heating and with fan 250Watt	1	Rm16	Rm16
2	Electric Heating Pot Socket (16A 250V)	1	Rm10	Rm10
3	Stainless steel grill	6	Rm20	Rm120
4	Plat SUS304 Stainless steel 3mm	6	Rm15	Rm80
5	Plat Stainless steel plat 3mm	6	Rm15	Rm90
6	1.0MM X 1.5 Meters 3 Pin 250V 13A Power Supply Cable	1	Rm9	Rm9
Total				Rm325

This is a list of items that have been used in the manufacture of this machine. This machine uses a cheap and quality components. We buy it at hardware stores and buy online at shopee, lazada and so on. This is to save manufacturing costs In addition, we also use the welding method and we do the welding ourselves. This can also save costs. So, the price of this Food Dehydrator is more affordable if you want to compare with the price of other Food Dehydrator.

4.4 Result Of The Study

A . Genaral view of study

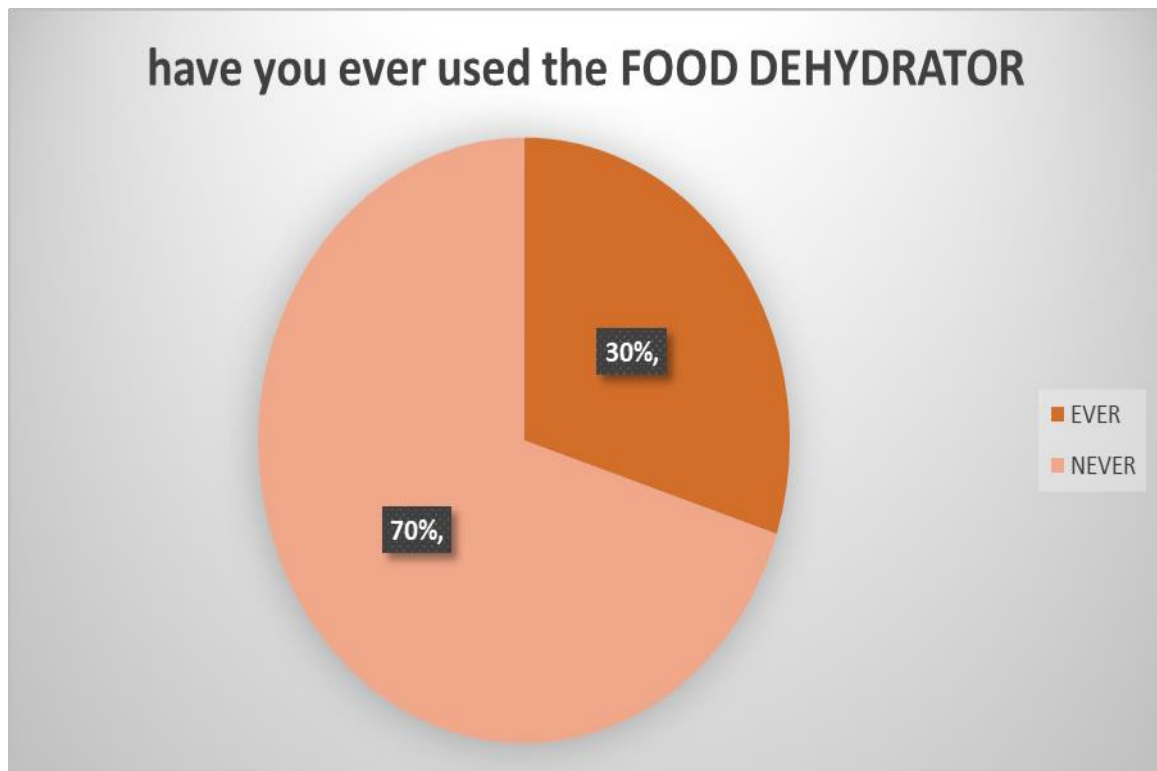


Figure4.4(a)(i)

The chart shows that many respondents have never used this machine, which is 70%. Only 30% have ever used it. This is because many do not know the existence of this machine in the market.

This is also how we rarely see this machine sold in the market. What is sold in the market are machines such as oven, microwave oven and others. There are no food dryers sold in the market yet. Therefore, many have don't know about the existence of this Food Dehydrator. So we create this Food Dehydrator and also can tell the people to use this Food Dehydrator

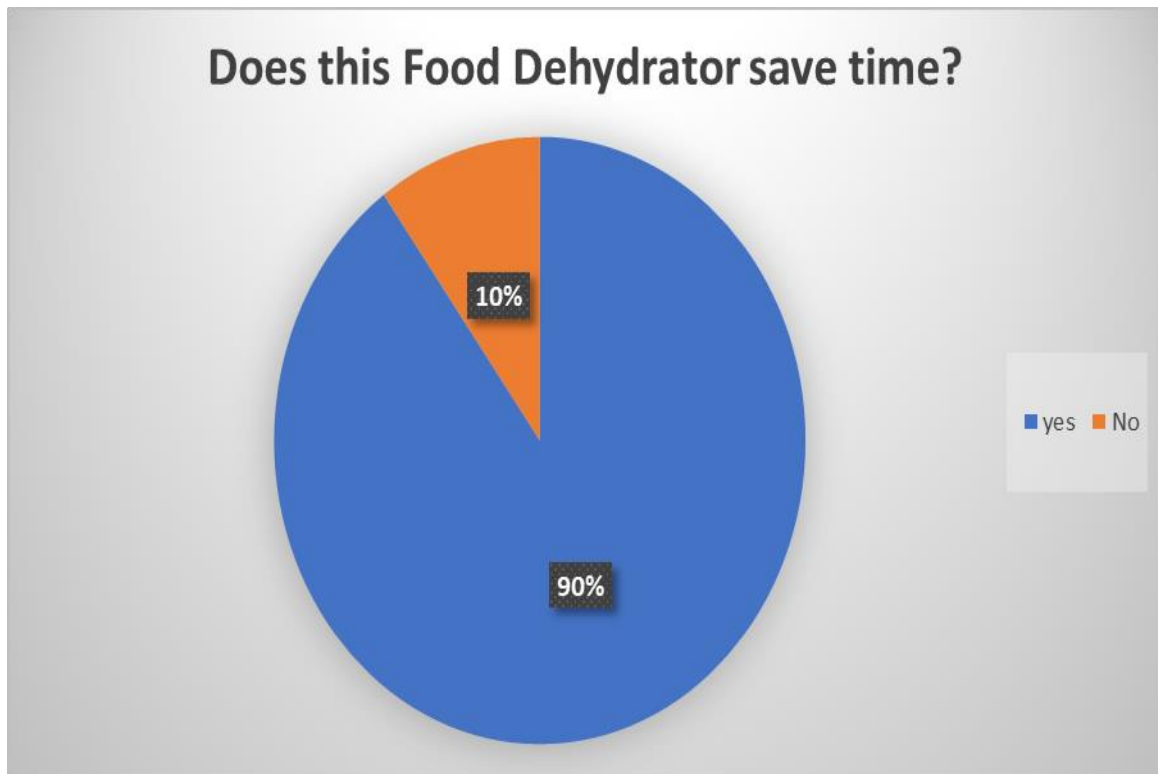


Figure 4.4(a) (ii)

The chart clearly shows that most respondents agree that this machine can save time. This is because, if you want to compare according to the method of natural drying (sunlight), it is a waste of time and energy. With this machine we just have to put and leave it and see every 3 hours. If you want to compare using natural drying method, you cant just leave the food because the sun-dried food is exposed to animals such as ants.

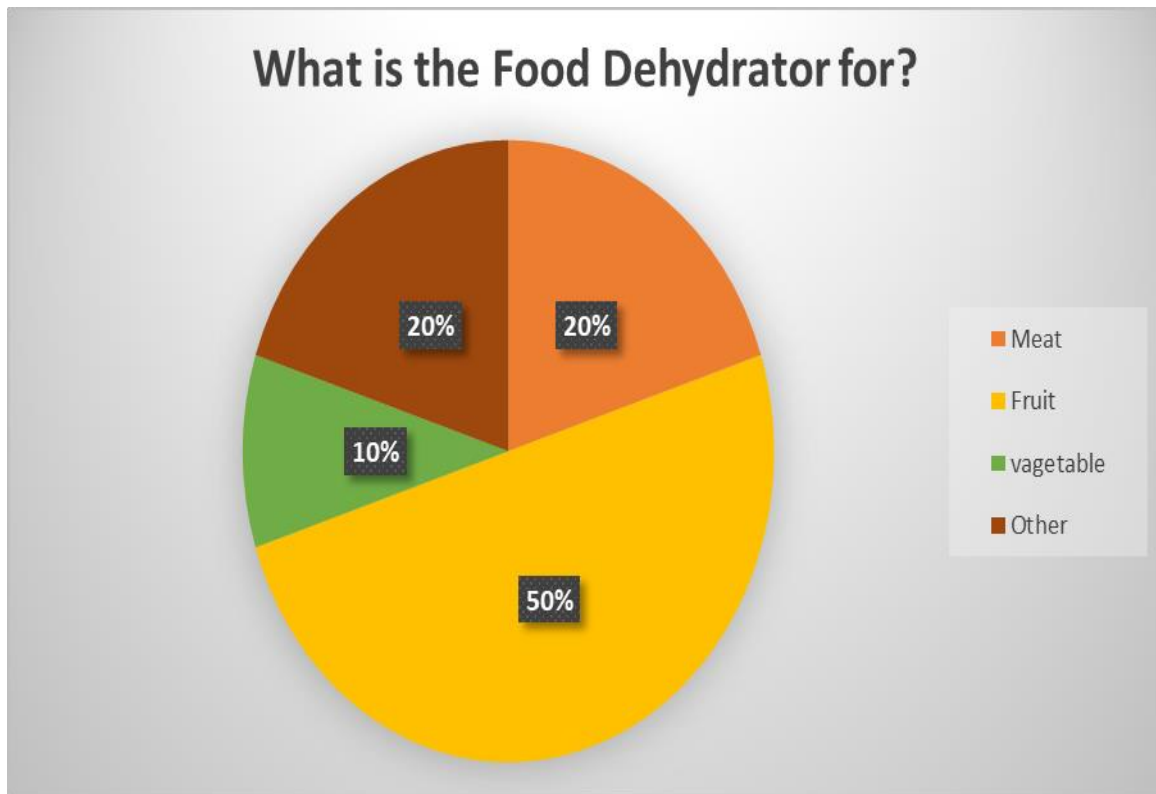


Figure 4.4(a) (iii)

This chart shown that many people choose to dry fruits using this the Food Dehydrator. There are 50% of respondents have chosen to dry fruits compared to other foods. This is because fruits have such properties. For example, various flavors such as sour and sweet. It will make the fruit taste so good after drying.

The second highest and the same percentage is meat and others. Some respondents believe that this machine can dry meat as well as other foods. Among the meat foods that can be dried are beef, mutton, rabbit and so on. For others, they use this machine for the purpose of drying the fish. As we know there are various types of dried fish available in supermarkets. Therefore, with this machine, they can dry the fish and meat at home only.

For the lowest percentage which is vegetables. This is because people rarely do not dry the vegetables, they prefer to cook fresh vegetables than dried vegetables. Except for dried vegetables that will be used in fast food such as maggi and so on.

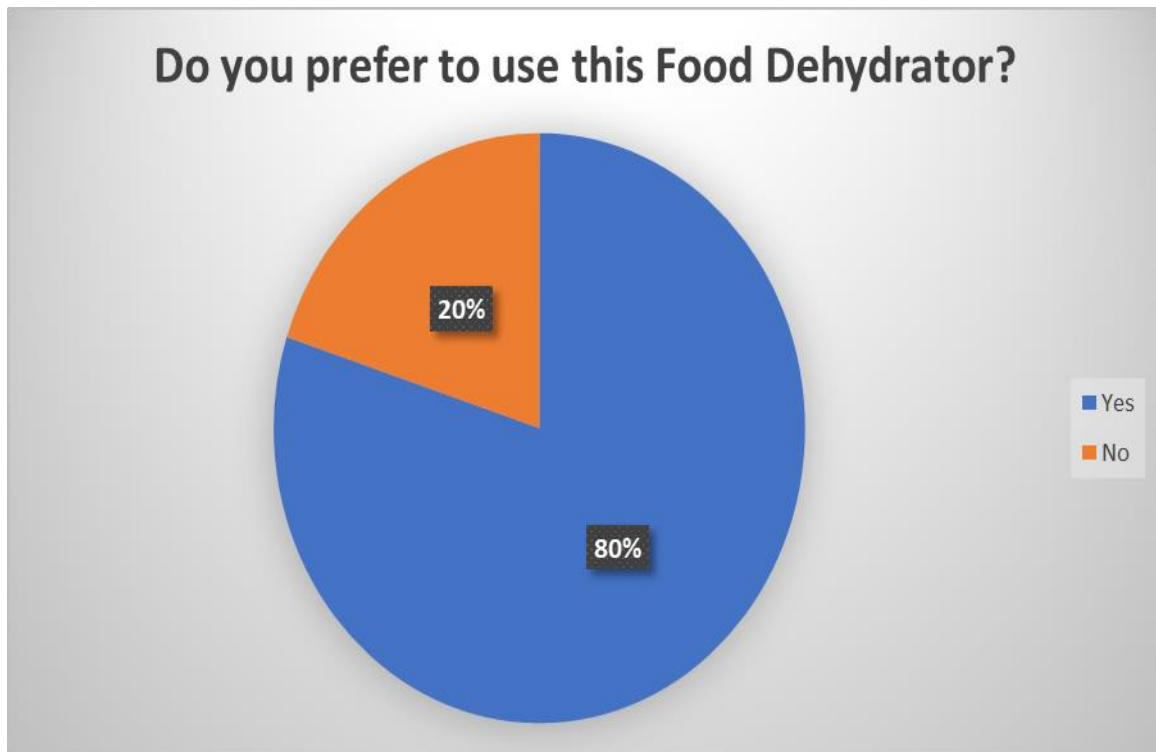


Figure 4.4(a) (iv)

The chart shows that many people want to try to use this machine. This is because, this machine is very useful and cant waste the time. This machine is also easy to use and can be used for everyone.

This machine is also suitable for people who are short of time and need a simple and fast machine. This machine is specially designed for those who want to make something without the need for more attention. This is because, this Food Dehydrator has been set on the timer.

Without this machine, if a person wants to dry food, they will dry using the natural method of drying in the sun and it takes a very long time compared to using this Food Dehydrator. With this method too, they need to see the weather that day. This is because, if you want to dried through the sun requires good weather so that the dried food can be dried well.

B . Respondent Perspective Of Food Dehydrator

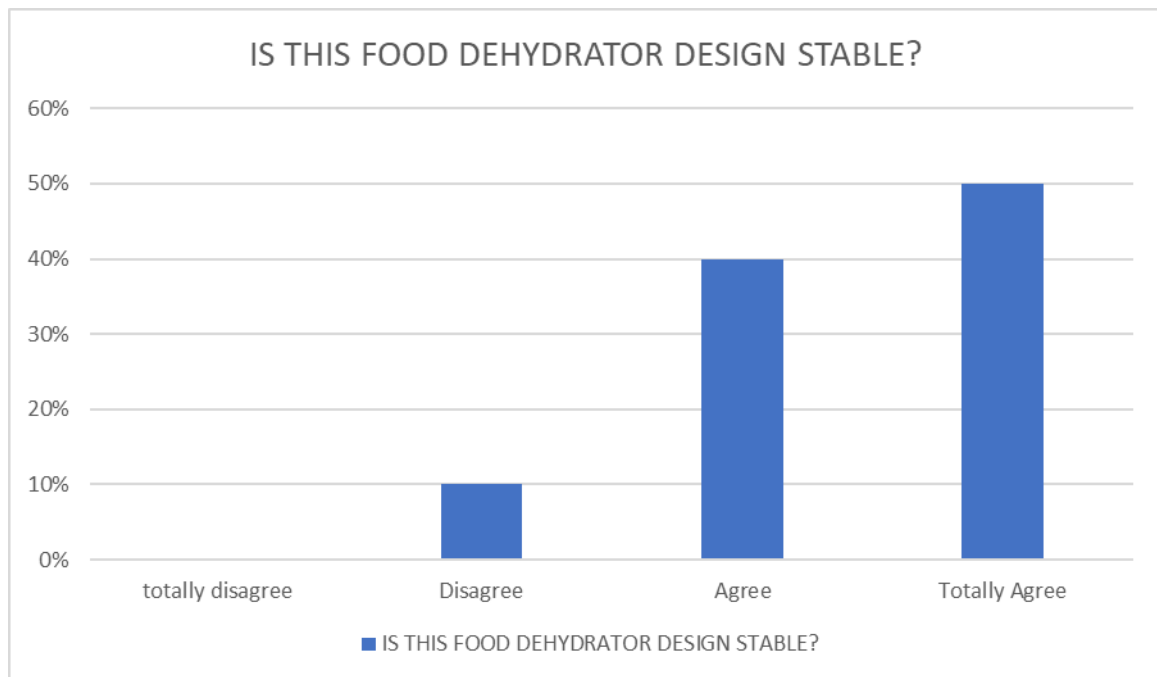


Figure 4.4(b) (i)

Based on the analysis in the highest choice diagram, it is agreed that the design of this product is stable which is 40% of the number of respondents. In addition, 50% of respondents strongly agree with the statement and 10% of respondents among the respondents are not sure the design of this product is stable or otherwise. The results of this questionnaire show that none of the respondents who disagree with the design of this product is stable.

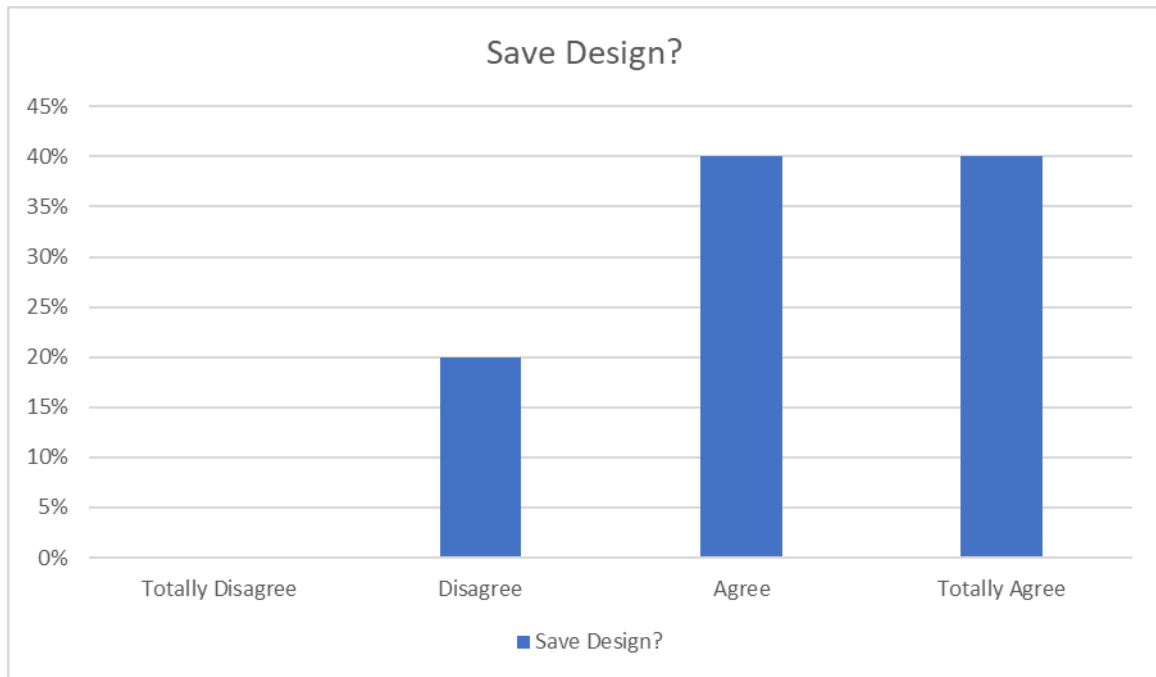


Figure 4.4(b)(ii)

The results of the analysis of the questionnaire in the diagram above show that the safe design got a good response from the respondents. The majority of the respondents 40% of the respondents totally agree that the design described is safe. This may be due to the design of the machine made according to the user's suitability. As many as 40% of the respondents also agreed with the statement and only 20% were not sure this design was safe.

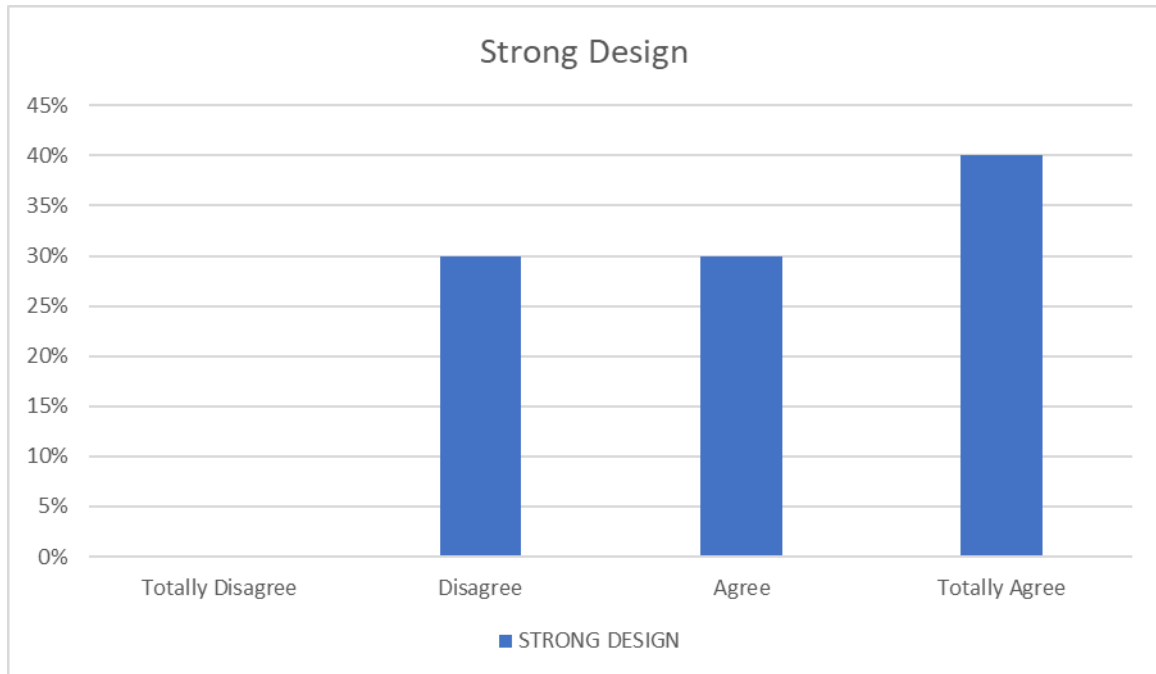


Figure 4.4(b)(iii)

In the diagram above, many respondents totally agree that the design of this product is strong, as many as 40% of respondents while another 30% of them do not agree because it is not certain that this design is strong as described. This may be because the respondent has never seen another form of Food Dehydrator that has been prepared. As many as 30% of respondents also agreed with their answers. Upon observation, none of the respondents stated totally disagree with the statement.

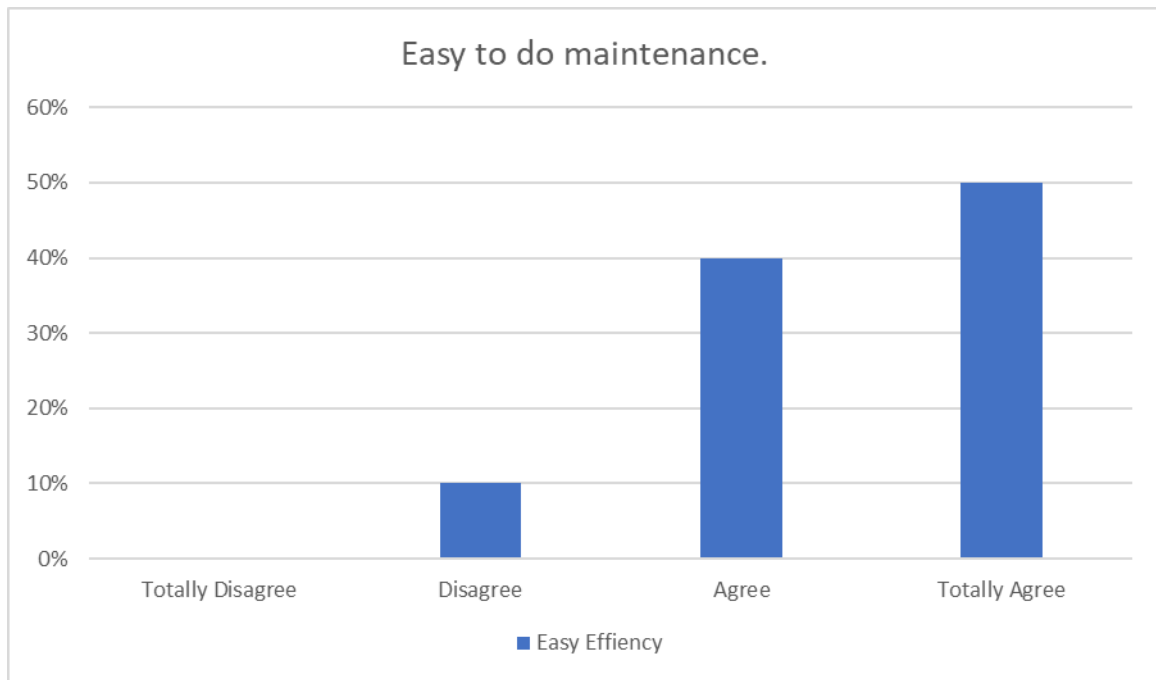


Figure 4.4(b)(iv)

From the diagram shows the response to the design reason facilitates maintenance work. The results of the study showed that 50% of the respondents totally agreed that this design facilitates maintenance work. While 40% of respondents agree that this design facilitates maintenance work and as many as 10% of respondents do not agree with the statement

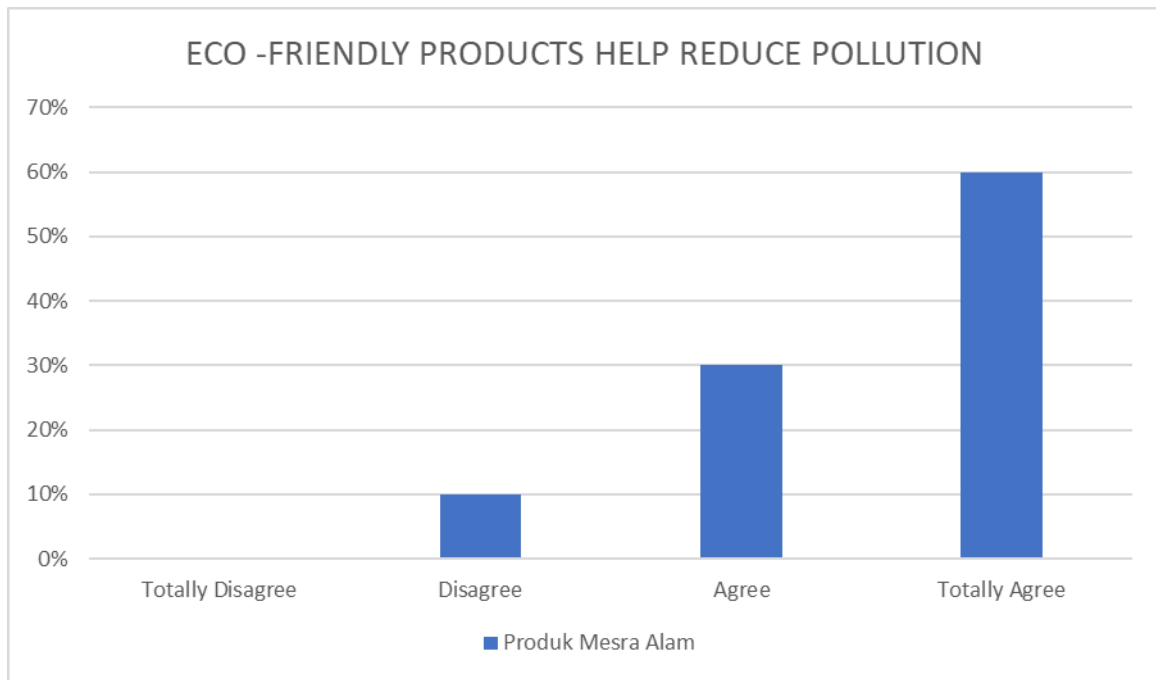


Figure 4.4(b)(v)

The diagram shows that most respondents totally agree that environmentally friendly products can help reduce pollution by 60% of respondents. While 30% of respondents agree with the statement. However, only 10% gave a disagreement.

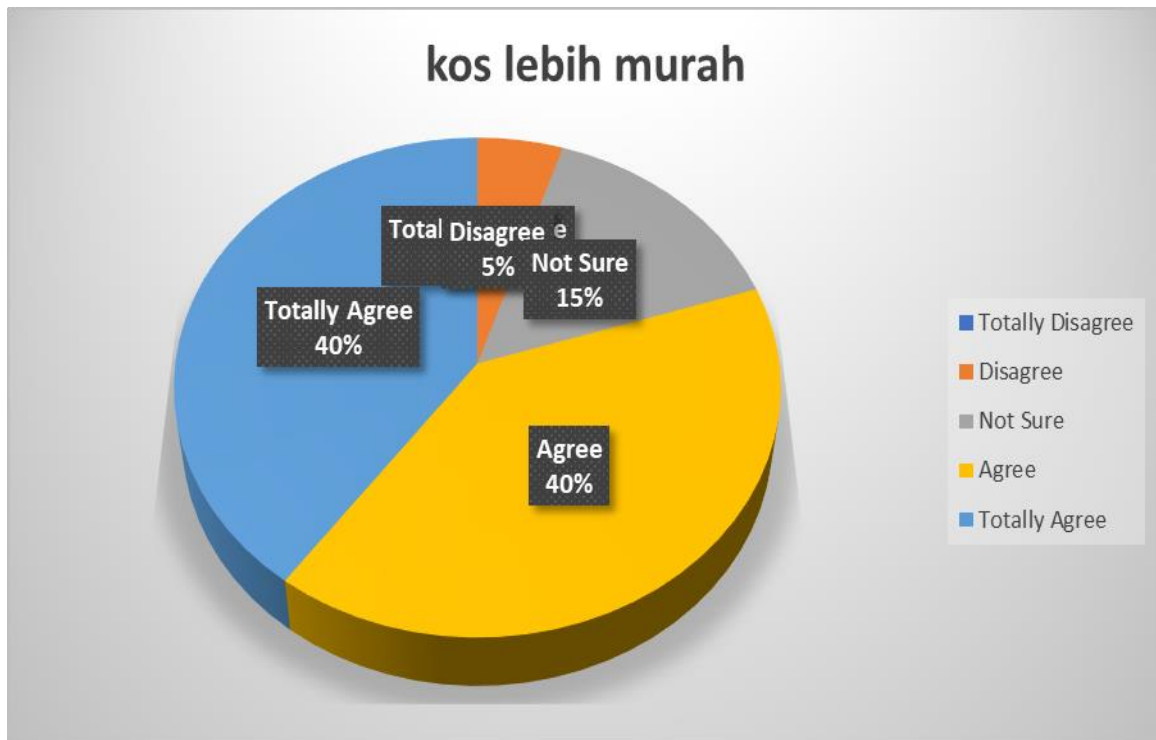


Figure 4.4(b)(vi)

In terms of cost, it shows the results of the analysis of the respondents' questionnaire regarding cost savings using Food Dehydrator. As many as 15% of respondents are not sure that this Food Dehydrator can save manufacturing costs. In addition, as many as 40% of respondents said they agree that this Food Dehydrator does not require high costs compared to other products. Furthermore, as many as 40% of the respondents gave a very agreeable response to the statement. When observed, only 5% disagreed.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

For this chapter, the decisions made are based on all the results obtained from the experiments conducted and the discussion in the previous chapter. Experiments from respondents were also taken. In this chapter as well, the relevant matters are about the objectives of the study as well as the recommendations of the study conducted. In addition, the data collected has also been recorded which is stored in the form of a chart. The chart can be seen in the previous chapter. conclusions have been drawn for this experiment.

5.2 Discussion

Once all experiments are performed on the machine and the data has been taken and recorded. This food dryer is safe to use because this machine has gone through a trial process that is this machine has been tried after several times and as a result this machine can be used safely. This machine has been tested by grinding the fruit for several hours. The machine is found to work well and is easy to operate. This machine also does not need to be seen regularly because this machine has been timed. The dried fruit is seen after 1 hour of drying to identify if the machine is working properly. After 1 hour the fruit is initially placed on the juicy surface and looks dry and not wet.

After that, this machine is very easy to use, This is because the way to use this machine is very simple and turn on the machine and then set the timer and temperature. The temperature will be set according to the type of food used. For example, the temperature used on the fruit is usually at the highest temperature on the machine which is 90 degrees Celsius and what will be different from each fruit is the time. This is because each fruit has a different quantity of water.

The airflow of this machine uses a fan and hot air to fill the machine and dry the food. The fan used is so high quality that the food to be dried can be dried perfectly.

5.3 Conclusion

The main objective of this study is to determine whether the manufacture of this food dryer should be manufacture. The collection of data and information about Food Dehydrator is by answer an online form (Google Form). The questions asked are as in the appendix. Among them is such as the machine uses low cost and in terms of design is the machine stable and safe to use in the long period. Data were taken and collected and then recorded in the form of pie charts and bar charts. From the following data we can see that there many respondent support for this project. In fact, there are a small number of respondent who disagree because they are more unsure of this project.

In this study, we focus more on the design and function of this machine. We would like to examine whether respondents are confident in the design that has been created. Once the data is taken it shows that the respondents are confident in the resulting design which is a stable and safe design to use. This Food Dehydrator have a stable and safe design is due to its square design which makes it stable. This machine is also not easy to move because of its weight which makes it stable and stays in place. This machine is safe because it provides a door that prevents it from direct to touch hot food. This machine is also made with a thick layer of stainless steel and makes this machine feel less hot even after using for a long time. Another safety feature of the machine is that the machine will not on until you seted up the timer.

Overall, with a food drying machine it can be easy for everyone to use with minimal energy and save time. In addition, it will also help a person to start a small business with ideas about new food products. The advantages of this food dryer also help everyone to come up with new ideas to produce new food products and be able to generate income from it.

So we hope that this machine we created can help and facilitate everyone who uses this machine. In addition, with this machine, everyone have not only dry food but also use it for other such as heating food. Therefore, we would like to thank to all respondent for cooperating in collecting data to fill out the online form. Thanks to all respondent efforts, we have been able to draw conclusions from the study that has been done. We hope that this machine can go far and can be proud of the name of the institution which is Polytechnic Sultan Salahuddin Abdul Aziz Shah.

5.3 Recommendation

Food dryer is a method used for food drying process. This machine can also solve problems such as weather and food quality.

Here are some things that are suggested for improvement and further improving the quality of food drying machines:

- 1) Increase the size of the Food Dehydrator so that it can dry food with more quantity.
- 2) Raise the temperature of the Food Dehydrator so that the food dries faster.
- 3) Increase the size of the blower heat fan to speed up the heating process.
- 4) Modify the look of the machine by adding a variety of accessories.

5.4.1 Recommended Food Dehydrator Details

This Food Dehydrator is designed according to the rectangular size (29.5cmx40.5cmx29.5cm). While the size of the grill used is slightly smaller according to the size of the length and width of the machine that is (25.0cmx35.0cm) according to the specifications set by the group members.

The size of such machines and grills has the ability to dry and load the quantity of food to be dried more because of its large design and construction size and able to load food more. In addition, the grill also comes with stainless steel sus304 to ensure proper heating and can dry food faster. In addition, the iron used will also not cause the iron to crack after being exposed to water released by food. For example, if the fruit dries, the fruit will remove the water contained in it. becomes rust and the grill can no longer be worn.

Beside that,we will also increase the temperature of Food Dehydrator from 80C to 130C. This can speed up the heating and drying of a food. This temperature will be increased by changing the temperature and increasing the size of the blower heat fan on the Food Dehydrator.

Lastly, we will beautify the look of the machine by adding various accessories. Examples of accessories that will be added are such as safety symbol stickers, stickers on the On Off and temperature. We will also hold a Food Dehydrator with a variety of attractive colors such as gray, white and others.

Some detailed information on the proposed Food Dehydrator: -

- Temperature - Increase the temperature of 80C to 130C and change the blower better to speed up the process of heating and drying food.

Saiz - Food Dehydrator sizes will be enlarged from ((29.5cmx40.5cmx29.5cm) to (40cmx50cmx40cm).

Assecories -Using more Assecories like hazard sticker and temperature with on off sticker.

-Produce many colour on Food Dehydrator body such as grey,white and so on.

- Cost - RM500 – RM600

- Material - Stainless steel sus304 and plat 3mm stainless steel.

- Maintenance method - Human (minimum labor)

- Advantages - Can load more food.

- Can heat and dry the food faster.

- Can attract the customer to buy the Food Dehydrator.

5.5 Summary

The results of the experiments that have been conducted on Food Dehydrator can be concluded that has achieved the objective of the study which is to determine that Food Dehydrator can dry food well and can facilitate public affairs. In addition, after several months of Food Dehydrator being used and tested again, it was found that the machine can be used and works well and safely. Food Dehydrator has proven to be effective and useful for everyone who uses it because it has made it easier for people to do food drying activities and can save time.

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APPENDIX

APPENDIX A – FEEDBACK ONLINE FORM (GOOGLE FORM)

APPENDIX B – FEEDBACK FORM

APPENDIX C – GUNT CHAT

APPENDIX A

FOOD DEHYDRATOR

Respondent Feedback

***Required**

Gender *


Female

Male

Age *

Your answer _____

Have you ever use the Food Dehydrator? *



Yes

No

Other: _____


Does this Food Dehydrator save your time? *

Yes


No

Other: _____


What is the Food Dehydrator drying for? *



Meat



Fruit




Do you prefer to use this Food Dehydrator? *

Yes

No

Other: _____

Is this Food Dehydrator design stable? *



Totally Agree

Agree

Disagree

Totally Disagree

Other: _____

Save Design? *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other: _____

Easy to do maintenance *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other: _____

Strong Design *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other: _____

Eco-friendly product help reduce pollution *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other: _____

Low cost of project *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other: _____

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APPENDIX B



Food Dehydrator Survey Questionnaire

Thank you for taking the time to answer these questions. The following questions are about to know how well known and successful is our project Food Dehydrator.(/)

1. Gender *

Male

Female

2.Age *

18-20

20-25

25-30

30-40

3. Have you ever used the Food Dehydrator? *

No

Yes

4. Does this Food Dehydrator save your time? *

Yes

No

5. What is the Food Dehydrator drying for? *

Meat

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Fruit

~

6. Do you prefer to use this Food Dehydrator? *

Yes

No

7. Is this Food Dehydrator design stable? *

Totally Agree

Agree

Disagree

Totally Disagree

Other

8. Save design? *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other

9. Strong Design *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other

10. Easy to do maintenance *

-

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- Totally Agree
-
- Agree
-
- Disagree

11. Eco-friendly product help reduce pollution *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other

12. Low Cost *

- Totally Agree
- Agree
- Disagree
- Totally Disagree
- Other