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Analysis of the level of effectiveness of using a simple spinner machine to drain oil in pothils

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Abstract: Pothil is a common regional dish from the Magelang region prepared with cassava. The peeling and frying of the cassava is the first step in the process of manufacturing pothil. People still utilize manual cooking oil drainers during the pothil frying process, which makes them ineffective at draining the oil. Using a dynamo, which is a device that transforms mechanical energy into electrical energy, one can create a basic spinner machine to assist with oil draining. The purpose of this study is to evaluate the efficiency of a basic spinner machine for draining oil from pots and to ascertain the correlation between rotation duration and oil production volume. This study used a quantitative experimental design, where oil volume was the dependent variable and rotation duration was the independent variable. An efficacy test utilizing oil paper to view the oil beams on the pothil was used to gauge how efficient utilizing a spinner machine would be. The study's findings indicate that when compared to turning the spinner machine for one or two minutes, a spinner machine that is rotated for three minutes can create the most oil—21 milliliters. Consequently, the longer the spinning period, the more oil is generated and the more successful the spinner machine is in lowering the oil content of the pothil.

Keywords: Pothil; spinners; oil

1. INTRODUCTION

The current rapid growth of industry has led to the emergence of several economic sectors. This is consistent with the way that technology advancements have shaped people's perspectives, among which is how they feel about processed food. The majority of food processing done nowadays uses instruments based on technology, and traditional food processing is still relatively unknown [1]. One of the nation's cultural values that needs to be maintained or lost as a result of the advancement of technology and civilization is traditional food [2]. In an attempt to maintain the authenticity of traditional cuisines, efforts are being made to enhance the appeal and desirability of currently available traditional snacks. The younger generation has to be introduced to the different methods and techniques used to make each traditional dish for them to understand more about traditional food. Science and technological developments can be applied to create traditional Indonesian culinary items that are suitable for contemporary living.

Pothil is a traditional dish from Magelang, Salaman District, prepared from cassava. Pothil is circular, golden, and resembles a ring that joins to make a big circle with a circumference of around 25 cm with a few sesame seeds on top. The cassava skin is cleaned and then grated using a cassava grater to make pothil. To separate the cassava flour from the cassava flesh, the grated cassava is squeezed. After three days, the cassava juice is crushed up and combined with the ground spices. It is then molded into a 10 cm-long circular pot and let sit overnight. Finishing the pothil preparation procedure involves deep-frying the pothil in hot oil.

People still use manual drainers when frying pothil, which renders the results of oil draining ineffective. The oil content in the pothil shortens its consumption life, and draining it manually or with a conventional oil drainer takes a lot of time [3]. In addition, as cooking oil can lead to heart disease and stroke, consumers are advised to cut back on their intake of foods high in oil. Cooking oil draining devices were developed in tandem with technology advancements to efficiently lower the oil content

of food. The purpose of the slicing machine is to lessen the amount of oil that is left over after food is fried [4].

Several researchers have made a basic spinner machine. For example, a study has been done on the design and construction of an oil-draining machine with a 6 kg capacity in a single process. According to the test results, cassava chips may be effectively drained and have their oil content reduced when drained using an oil-draining machine. The amount of oil drained can also vary depending on how long the draining process takes [5]. In addition, research is done on oil draining machines for cassava chips that have a 10-kilogram capacity each draining cycle. According to test results, cassava chips' oil content will drop after draining for 15 minutes, extending their shelf life by two months [6].

The creation of an oil-draining device, also known as a spinner, is essential as it can expedite the process of lowering oil levels. Researchers created and produced an oil drainage device (spinning) as part of this study. In addition, to assess the efficacy of the manufactured spinner machine, researchers examined the machine's level of effectiveness using oil paper. No prior research has evaluated the degree of effectiveness of employing a spinner machine. Thus, the purpose of this study is to ascertain the degree of efficacy in draining pothil using a basic spinner machine and the correlation between rotation time and oil production volume. This machine is intended to lower the oil content of pothil because eating food that still contains oil can lead to heart disease and stroke [7].

2. METHOD

This study employed a quantitative experimental design. To assess the degree of efficacy of operating the spinner machine, the researcher used quantitative research methodologies to ascertain the importance of the link between the variables analyzed, specifically the relationship between rotation time and the amount of oil generated. The mass of pothil added to the simple spinner machine serves as the control variable in this study, while rotation duration serves as the independent variable. The dependent variable is the amount of oil produced by the machine. The research stages' flow diagram is displayed in Figure 1.

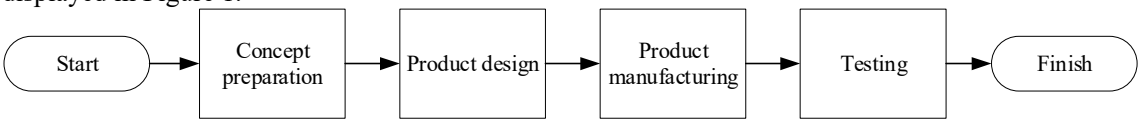

Figure 1. Flow diagram of research stages

When creating a spinner machine, the idea preparation phase is crucial. An excellent concept will identify the best machine and design model [8]. The spinner machine model is chosen, the system is chosen, components are built, and other considerations like machine longevity, mechanism simplicity, and the machine's productivity and efficiency are taken into account during the idea preparation stage. To create an appropriate design that would successfully minimize the oil content in the pothil, research was initially conducted to build a basic spinner machine. Figure 1 depicts the basic design of a spinner machine.

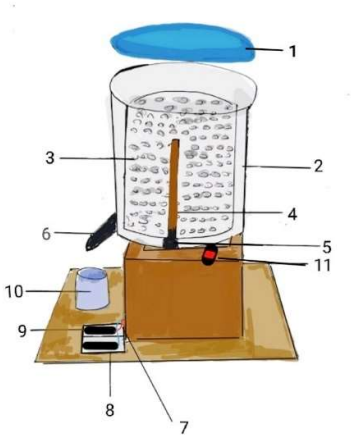

Figure 2. Simple spinner machine design

Description:

1. Close the spinner
2. Cover spinner
3. Spinner rack
4. Support pole
5. Dynamo
6. Oil pipeline
7. Cable
8. Battery holder
9. Battery stone
10. Oil storage container
11. Switch

A basic spinner machine's design drawing is displayed in Figure 2. The spinner machine lid, part number 1, helps prevent oil and pothil from spilling during the draining operation. The spinner lid and rack, which double as a container and oil drain filter tube, are parts number two and three. The spinner machine can be supported by part number 4, which is a support pole, to prevent it from moving abruptly during the draining process due to the spinner machine's rotation. The dynamo, which is part number five, serves as the spinner machine's power source and transforms mechanical energy into electrical energy. The oil pipe, part number six, serves as a conduit for the oil generated during the draining procedure. The connection that connects the battery to the dynamo (part number 7) allows current to move from the primary voltage source to the dynamo. The battery compartment and battery, which serve as a source of electrical energy, are shown in parts 8 and 9. The purpose of part number 10, an oil storage container, is to contain the oil generated during draining. The switch in part number 11 is used to turn on and off the electricity in the spinner machine.

The design stage involves developing a design based on the developed concept, including figuring out the sizes and materials of each component. The goal of the spinner machine element design is to produce a spinner machine that is robust, safe, and long-lasting. A dynamo, which is utilized in a basic spinner machine, may transform mechanical energy into electrical energy, which is then used to rotate the jar [9]. Because users don't have to spin the spinner machine manually, this dynamo machine seeks to make utilizing it easier for users. When the spinner machine is turned on, the oil in the pothil will exit through the oil pipe as the machine's tube rotates.

The process of creating a product by design is known as the product manufacturing stage. This phase will ascertain if the product succeeds or fails. Based on the manufactured components, an assembly procedure is used to create a spinner machine. The outcomes of product design determine the parts and components that are produced. To generate a great product, product production adheres to a precise assembly procedure and the intended design.

The purpose of the testing phase was to ascertain whether the spinner machine under construction could function as intended and efficiently. The purpose of this testing procedure was to ascertain how engine performance and engine drain time related to the amount of oil generated. 200 grams of freshly cooked pothil were placed into the spinner machine, and it was rotated for one, two, and three minutes to see the variations in the amount of oil produced. The oil production volume of the spinner machine was then measured using a measuring cup. Using oil paper, the efficacy of a basic spinner machine was evaluated. As long as the oil paper has few oil spots on it, using a basic spinner machine is considered beneficial. On the other hand, it is ineffective to use a basic spinner machine to drain the oil if the paper has numerous oil spots on it. The following formula can be used to determine the oil draining percentage level of effectiveness [10]:

$$Km = \frac{(P1-P2)}{P1} \quad (1)$$

Description:
Km = Oil drained (%)
P1 = Sample weight before draining (grams)
P2 = Sample weight after draining (grams)

3. RESULTS AND DISCUSSION

3.1 Design and manufacturing of a simple spinner machine

A model or shape with a construction design that uses a dynamo as the primary driver of the spinner machine instead of human power can be used to create a simple spinner machine design. This pothole-draining device spins at a fast enough pace to maximize pothole drainage. The spinner machine doesn't pollute the air and is designed to be simple to use. In addition, the spinner machine does not make noise when it is in operation. A spinner machine is easily designed by following the steps of frame preparation, inner tube preparation, outer tube preparation, shaft preparation, assembly, and finishing. The manufactured basic spinner machine goods are displayed in Figure 3 and Figure 4.

A side view of a basic spinner machine product is shown in Figure 3. The outer and inner tubes of the spinner serve as a container for pothil, which will eventually be emptied, and there is a button on

the side of the machine that helps connect and disconnect the electric current. A front view of a basic spinner machine is shown in Figure 4. The oil drain pipe, battery compartment, and support pole on the front of the spinner machine give it stability when the tube turns.

Figure 3. Spinner machine side view

Figure 4. Spinner machine front view

A dynamo is employed in the production of oil drainers and spinner machines. It is capable of converting mechanical energy into electrical energy, which powers the tube's rapid rotation. Because customers do not need to spin the machine manually, the dynamo on this spinner attempts to make user experience easier. The tube within the spinner machine will spin when the dynamo is turned on. The residual frying oil can be separated by the spinner machine's rotation and removed via the oil drain pipe [11]. A basic spinner machine can lower the oil content of pothil because eating food that is still high in oil can lead to heart disease and stroke [12].

3.2 Test results

Testing is done to ascertain the performance of the manufactured spinner machine before the oil is drained from the pothil. Additionally, a testing procedure can be used to ascertain the link between the spinner machine's rotation time and the volume of oil produced to assess how effective a basic spinner machine is at lowering the oil levels in Pothil.

Table 1. Comparison of rotation time with oil volume

No.	Lap time (minutes)	Pothil initial weight (grams)	Drained oil volume (ml)	Pothil final weight (grams)	Percentage of oil drained (%)
1.	1 minute	200 grams	10 ml	190 grams	5%
2.	2 minute	200 grams	16 ml	184 grams	8%
3.	3 minute	200 grams	21 ml	179 grams	10,5%

By varying the rotation time of a basic spinner machine to calculate the volume of oil produced, Table 1 compares the rotation time and oil volume. A basic spinner machine has three different rotation times: one minute, two minutes, and three minutes. In all three studies, the pothil that was placed into the basic spinner machine weighed the same—200 grams.

The test findings demonstrate that the crudely constructed spinning machine is capable of effectively extracting oil from pothil. In addition, the test results demonstrate that the pothil, when rotated for one minute, yields an oil volume of ten milliliters with a 5% drained oil percentage. Even though there appears to be less oil in the pothil, it still appears oily. Pothil generates 16 cc of oil with a drained oil percentage of 8% after two minutes of spinning. Although there is less oil in the pothil now than there was initially, it still appears a touch greasy. After three minutes of rotation, the last observation yielded 21 milliliters of oil with a 10.5% drained oil percentage. Pothil's oil content has been drastically reduced, making it non-greasy.

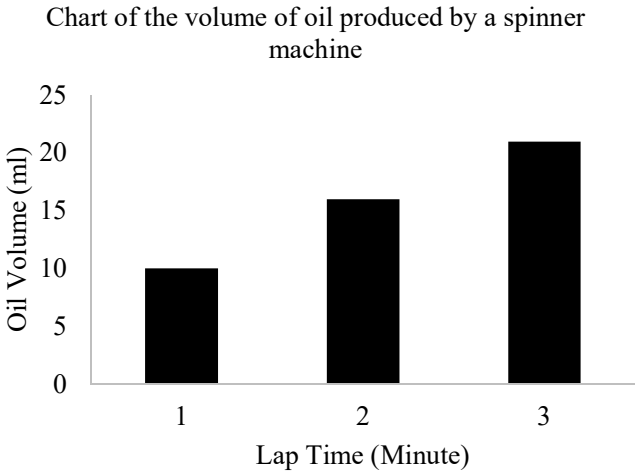

Figure 5. Graph of the volume of oil produced by a spinner machine

A graph in Figure 5 illustrates how variations in a basic spinner machine's rotation time affect the amount of oil that is produced. The amount of oil poured from the pothil increases with the length of time a simple spinner machine rotates. Consequently, the longer the spinning period, the more oil is generated and the more successful the spinner machine is in lowering the oil content of the pothil. As a result of the spinner's constant speed, the oil pouring gets worse over time [13]. Thus, more oil will be drained the longer the game is played.

Pothil effectiveness testing is a procedure used to evaluate how well a system, product, or technique can meet predefined requirements and accomplish objectives. Effectiveness assessment has applications in many domains, including technology, education, healthcare, and industry. To determine pothil's efficacy, pothil that has been drained using a basic spinner machine is placed onto oil paper to observe the resulting oil bundles.

Figure 6. The pothil has an oil beam that rotates once every minute

Figure 7. The oil beam on the pothil rotates every two minutes

Figure 8. A three-minute-rotating oil beam on the pothil

With a rotation time of one minute, Figure 6 illustrates the outcomes of the oil draining process with still very high oil production. Figure 7 illustrates the outcomes of the oil draining procedure using a 2-minute rotation duration, which produced less oil than a 1-minute rotation duration. The oil draining process with a three-minute rotation period is depicted in Figure 8. Considering that the rotation times are one minute and two minutes, the resulting oil beams are minuscule.

It may be shown from studies on the efficacy of utilizing a basic spinner machine for oil draining that fewer oil strands are created on oil paper the longer the oil draining period on the pothil. A basic spinner machine turned for three minutes will allow the oil to drain correctly and improve the effectiveness of the pothil draining process. The outcomes of the experiment demonstrate that time

can affect how quickly oil drains in pothil. More oil is produced and fewer oil streaks are generated on the oil paper the longer the draining period is.

There are several advantages to using a spinner machine to lower the oil content of food, such as: Food that has been drained with a basic spinner machine contains less oil, which can enhance food quality because oily food can be harmful to one's health [14]; Prolongs the shelf life of food: food that has been fried and not properly drained of oil will soon become stale, while food that has been properly drained will keep for a considerably longer period [15]; The food gets crunchier; utilizing a food spinner machine can make the food even crispier and crunchier.

3 CONCLUSION

According to the test results, a basic spinner machine with a dynamo design may efficiently perform its intended function of lowering the oil content in pothil. The test results also demonstrate that the amount of oil drained increases with the length of time the spinner machine rotates to empty the pothil. Oil leakage increases with time when the spinner is rotated at a constant pace. Consequently, pothil oil can be effectively drained using a basic spinner machine.

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