Increasing production capacity at Lontong industry “Pak To”

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Abstract: The program of community empowerment was conducted at Lontong industry “Pak To” which is located in Merjosari, Malang. The Lontong industry has been producing Lontong since 2009. Based on the observation, identification, and interview by the team, this industry had the main problem that they were unable to fulfill the high market demand. As a result, this industry must refuse the orders as they are only able to produce lontong in their limited capacity. Considering this condition, the community service team conducted an analysis, design, and manufacture of lontong steamer to overcome the industry problems. The lontong steamer was designed to cook 500 pieces of lontong for production. The material for the lontong steamer is a 304 stainless steel plate with 0.6 mm thickness. It was selected for this steamer because it is food grade. 304 stainless steel plate has good mechanical characteristics. It is non-toxic for food and safe for consumption tools. Moreover, this material has long durability for household appliances as it has heat resistance characteristics and relatively has a low corrosion rate. The lontong steamer was designed in three main parts: the steamer body, bottom, and lid. The plate was measured and cut in a different dimension for each part. For the steamer body, it was determined 80 cm in height and 50 cm in diameter. Meanwhile, the bottom of the steamer was designed with the same diameter but with a different height, 20 cm. The lid was designed 2 cm wider in diameter than the steamer to make it cover all the upper parts of the body steamer. The purpose is to maintain the stem in the steamer to cook the lontong. In the community service program, the team also gave training assistance to the industry regarding lontong steamers for safe application. Furthermore, the Standard Operating Procedures (SOP) for the use of lontong steamer have also been provided to the industry.

Keywords: lontong, lontong industry, lontong steamer, production capacity improvement

1. Introduction

Lontong is a local Indonesian food that developed among the people of Java [1] other than ketupat. Those are dense in texture but soft when eaten. The difference between them is in the wrapping. Lontong is made of rice wrapped in banana leaves and steamed over boiling water for several hours [2], while ketupat uses coconut leaves with the same process procedure as lontong. Lontong is commonly served with several Indonesian dishes such as bakso (Indonesian meatballs), satay, rujak, and gado-gado [3]. As mostly it is boiled in banana leaves, the original Indonesian lontong has greenish color on the surface and it is still white on the inside as the color of rice [4]. Lontong can be found in various regions in Indonesia as an alternative way of eating rice [5]. Although it is also made of rice, lontong has an appetizing aroma [6].

In 160 grams of ketupat, it contains only 32 kcal of calories [7], 2.24 grams of protein, 0.112 grams of fat, and 43.2 grams of carbohydrates [8]. Not much different from ketupat, in 200 grams of lontong, it contains 38 kcal of calories [9]. Moreover, it also contains 5.44 grams of protein, 1.64 grams of fat, and 62.12 grams of carbohydrates [10]. Meanwhile, in 100 grams of white rice, the calorie is 175 kcal [11] 3 grams of protein, 0.3 grams of fat, and 39.8 grams of carbohydrates [12]. White rice, ketupat, and lontong are equally beneficial for the body's energy supply.
and can be consumed as staple foods [13]. However, by reviewing the calorie content, consuming ketupat and lontong tends to be healthier than white rice [14] as it has fewer calories. Ketupat and lontong also good for those who are in the effort to maintain their weight and have a diet for diabetes [15].

“Pak To” lontong industry is located in Merjosari, one of the districts in Malang. It has been producing lontong since 2009. This industry was named after the owner's name, Harianto. Steps to produce lontong are easy procedures. The preparation begins with cleaning the banana leaves and ripping them into the proper size of sheets to wrap the rice. Furthermore, the banana sheets must be rolled up and shaped like a tube to hold the rice during the cooking process. The rice must be rinsed before it is poured into the banana leaves. Harianto as the owner of lontong industry has established cooperation regarding the stock of the main raw materials with the farmers in Njuwet, Malang Regency. The rice used in this production is the premium quality rice to maintain the quality of lontong. Lontong is produced into two sizes, small and big. It depends on the market demands. The small size of lontong is produced with one tablespoon of rice, while the large one is produced with two tablespoons of rice. Afterward, the process continues to steam the wrapped rice into lontong. The steaming process uses a simple stove fueled by wood. The steamer is made of aluminum with a diameter of 50 cm, a height of 80 cm, and 0.6 mm thickness. The steaming process runs for 4 hours. Currently, lontong products by Harianto can produce up to 1000 pieces per day. However, during Eid al-Fitr, the demand for lontong increase up to 4 times per day. The wholesaler price of lontong at lontong industry “Pak To” is around IDR 1,250 per piece. At this time, Lontong industry “Pak To” has several resellers in the Blimbing Market.

Observation, identification, and interviews were conducted. It showed the problems faced by the lontong industry. The first is the limited area for steaming lontong. Presently, there are three furnaces and three steamers (one small steamer and two large steamers) used in lontong industry for production. The small steamer has 300 pieces of lontong capacity, while the large steamer has 450 pieces capacity. The second obstacle faced by this industry is the limited number of steamers. This condition makes this industry wait for several hours to cool lontong to room temperature before another steaming process periodically. It is difficult when they have orders in large quantities. Furthermore, the other obstacle is the large quantities of orders they must fill in a short time, and of course, they are unable to produce them. This is because the process of producing lontong takes a long time and currently, this industry only has three steamers for production.

Figure 1. The use of a wood-fueled furnace in the steaming process
During the pandemic of Covid-19, this industry did not experience a significant decline in market demand. It is because it tends to get new customers and maintains the production of around 1000 pieces of lontong per day. This Lontong industry has a promising potential as a food business in the long term because lontong produced by Hariant is unique in terms of texture. Customers can request the texture of lontong. According to Harianto, the texture of lontong is the customers’ taste. Some customers ask for a soft texture on the inside only, but some other customers ask for a soft texture on the outside and inside. Of course, this industry can fulfill this demand. Lontong produced by Harianto will not go stale for up to 19 hours at room temperature. Meanwhile, if it is placed in the refrigerator, it can last for 4 days. Currently, there are several competitors in Merjosari. However, the lontong industry “Pak To” can maintain the product quality that it can survive a crisis during the pandemic condition. The existence of this industry can be a resource of living for the surrounding community. This condition brings a positive impact in terms of social and economic.

Reviewing the obstacles faced by the industry, the community service team of Engineering Faculty Universitas Muhammadiyah Malang brought the solution to deal with the problems. It concentrated on increasing the number of lontong steamer with a capacity of 500 pieces per process. The larger steamer aimed to increase the production capacity of this industry. While the steaming process is in progress, the workers in charge of steaming can prepare and fill another steamer with lontong that is ready to be steamed. Thus, when the steaming process in the first steamer is complete, it can be continued with another steamer without waiting for the previously steamed lontong at room temperature.

2. Method

The community service team conducted observation and interview with the owner of lontong industry “Pak To” located in Merjosari, Malang. This method was conducted to identify the problems faced by this industry. The observation was conducted in the kitchen regarding the appliances for production, the stove, and the capacity of steamer used by this industry. Observation is an appropriate method to conduct qualitative studies in an industry as it gives real-time data from the phenomenon observed. From the results of these observations, the industry informed their obstacles in producing their products. They were unable to fulfill the market demand in large numbers of lontong. All this time, it was only able to...
produce 1200 lontong per day while the market demand has reached 2000 lontong per day. As a consequence, this industry has to refuse the orders and produced the numbers they can fill. Furthermore, the community service team analyzed the need, design, and manufacture of lontong steamer to overcome the problems.

The lontong steamer consists of 3 main parts, the steamer body, bottom, and lid. The steamer was made of a 304 stainless steel plate with 0.6 mm thickness. For the steamer body, it was determined on 80 cm of height and 50 cm of diameter. Meanwhile, the bottom part was 50 cm in diameter, and the lid was designed 2 cm wider than the body diameter to cover all the upper parts of the steamer during the cooking process. The 304 stainless steel plate was used as the main material for the steamer because the plate has good resistance and is non-toxic for food. In addition, the use of this material is more durable because stainless steel has a relatively low corrosion rate.

The steamer was tested for cooking lontong before it was applied to lontong industry “Pak To”. The result of testing shows that the steamer with 304 stainless steel material and wider dimension gave a better quality of lontong and increased the quantity of the products. The steamer was given to the industry in October 2021 to increase its production capacity. Furthermore, the team provided training and assistance to apply the steamer safely in producing lontong. For the guidance in applying and maintaining the steamer, the team also gave the Standard operating procedures (SOP) to the lontong industry “Pak To”.

3. Result and Discussion

The working principle of lontong steamer is generally utilizing the steam from boiled water in a closed steamer to cook the rice to be lontong. Heating the steamer can use a wood-fueled stove (Indonesian traditional stove) or an LPG stove. The heat generated from the fire causes heat transfer between the fire and the steamer where the water is boiled. Heated water will reach a boiling temperature of 100°C. After that, the water will change phase to steam. Hot steam is used to cook the lontong.

As shown in Figure 1, the lid was designed to cover the upper part of the steamer. The height of the lid was designed 8 cm height that it can seal the steamer to cook lontong. The lid used the same material as the steamer to restrain the pressure from the steam during the cooking process. The handle was provided on the lid to facilitate the user opening it from the steamer after the lontong was cooked and ready to cool. Moreover, the handles were also provided on the opposite sides of the lontong steamer. It aimed to make it easier for the cook to lift it from the stove. Furthermore, the steamer was also provided with a strainer on the inside. It is mounted between the upper part and the lower part of the steamer. It functioned to hold the lontong in the upper part to prevent lontong sank into the boiling water. It is because the cooking process of lontong only needs steam to cook it. Meanwhile, the lower part under the strainer is the place where the water is boiled. The steam of boiled water cooks the lontong. The bigger dimension of steamer given to this industry solved their problem because they have an additional appliance to increase their production. This industry can cook 500 pieces capacity for a production process with this steamer.
*Lontong* steamer was manufactured with the determined specifications. The specification of this steamer was decided based on the needs of the industry. The steamer was designed with a bigger dimension with more capacity than the smaller steamer owned by the industry. It is aimed to fulfill the high market demands that it can reach more than 1000 *lontong* per day.

<table>
<thead>
<tr>
<th>Steamer parts</th>
<th>Diameter</th>
<th>Height</th>
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</thead>
<tbody>
<tr>
<td>Body</td>
<td>50 cm</td>
<td>80 cm</td>
</tr>
<tr>
<td>Upper part</td>
<td>50 cm</td>
<td>60 cm</td>
</tr>
<tr>
<td>Lower part</td>
<td>50 cm</td>
<td>20 cm</td>
</tr>
<tr>
<td>Lid</td>
<td>50 cm</td>
<td>8 cm</td>
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Figure 1. Design of *lontong* steamer. (a) The lid, (b) the steamer

Figure 2. The manufacturing process of *lontong* steamer. (a) Processing the bottom part, (b) rolling the plate for making the body part of the steamer, (c) welding and assembly the *lontong* steamer.
The process of manufacturing *lontong* steamer was conducted at the Sumber Rejeki Workshop, which is located at Jl. Joyo Taman Sari I No.48 Merjosari, Malang. The manufacturing of the *lontong* steamer initiated with processing the bottom part of the *lontong* steamer (Figure 2. a). A hydraulic machine was used to produce the hollow in the bottom. It is to transfer the steam from boiling water to cook *lontong*. Furthermore, the rolling process of the plate for the steamer body was conducted (Figure 2. b), and for the further process was assembly all parts of the steamer using SMAW electric welding (Figure 2. c). The last process was finishing and cleaning the surface of *lontong* steamer. In this process, the *lontong* steamer is ground and sanded to refine the welding results.

The *lontong* steamer was tested before it was given to the industry. The team and the owner of the industry prepared 500 rolled-wrapping rice to cook to be *lontong*. That uncooked *lontong* was cooked with the same procedure as the smaller steamer. This test aimed to find out that *lontong* is cooked well in a bigger capacity. After four hours of cooking, *lontong* was tasted. *Lontong* had good quality because the 500 pieces of them can be cooked evenly. They had the same texture and were cooked well. Therefore, from the test, the *lontong* steamer used in the implementation of this program is ready for a production capacity of 500 *lontong*/process. From the experimental results, the use of 304 stainless steel gave a better quality of *lontong* compared to aluminum steamer because the lid can seal well the steamer during the cooking process and the steamer has resistance to the steam pressure.

Figure 3. (a) Testing the *lontong* steamer, (b) giving *lontong* steamer to the industry
Lontong steamer given to the industry was one unit. By this time, this number is adequate to increase the lontong industry capacity. The additional steamer can increase their productions to fulfill the market demand and to develop their business. After giving the steamer to the industry, the team also gave training and assistance to the industry regarding the safe application of the steamer. The standard operating procedures (SOP) for using and maintaining the steamer have also been provided.

4. Conclusion
The problem experienced by lontong industry “Pak To” was they unable to fulfill the high market demand because they have limited facilities to produce lontong. The community program supported by Universitas Muhammadiyah Malang, especially by Engineering Faculty brought a team to bring the solution for the lontong industry to increase its production. The team analyzed and observed the condition of the industry to find out the problems they face. Moreover, the team also interviewed the owner of the industry, Pak Harianto. As a result of the interview and observation, this industry needed to increase production to fulfill the market demand and one of the needs was the production appliance to cook lontong. The team was determined the steamer with food-grade material for the industry. It was used 304 stainless steel that is durable to heat temperature and has a low rate of corrosion. The steamer was produced in a bigger dimension to cook 500 pieces of lontong for production. Therefore, the lontong industry can increase its production to fulfill the market demand.

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References


