PRIMA
Journal of Community Empowering and Services
ISSN 2579-5074 (Online)

PRIMA: *Journal of Community Empowering and Services*. 6(1), 62-70, 2022
URL: https://jurnal.uns.ac.id/prima/issue/view/61015
DOI: https://doi.org/10.20961/prima.v5i1.61015

The Application of Appropriate Technology for Basreng Crackers Dough Mixer Machine for Home Industry Development

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Submitted: 2022-04-27, Accepted: 2022-09-01

ABSTRACT

Basreng crackers are fried meatball crackers produced by Small and Medium Enterprises (SME) Sumber Rejeki and are named Kripik Basreng. Basreng is a cracker made from tapioca flour, noodles, and eggs. The problem faced by Sumber Rejeki SME's that if the SME produces in a large capacity, the kneading process takes a long time and the ingredients used are not mixed evenly. This activity aims to introduce dough machines in SME Sumber Rejeki. The method is participatory by involving SME Sumber Rejeki, starting from the need identification stage, design, and machine introduction. As a result of these activities, the community service team succeeded in realizing a dough kneading machine under the needs and desires of SME Sumber Rejeki. This machine can increase time efficiency by about 80-90% and reduction of labor operating costs by IDR 2,000/prescription processing. The process of making dough is only one-sixth time per recipe compared to without using a machine. This process has an impact on the workforce being able to do other jobs so that they are more productive. This condition affects increasing the production capacity of basreng up to 400% per day and improving the dough quality. The side effect is good business management to production basreng more efficient than previous and fulfilled the demand quickly.

Keywords: basreng, recipe, dough, efficient, productive

INTRODUCTION

The Micro, Small, and Medium Enterprises are engaged in small or rural areas which are currently experiencing fairly good development (Ledianti *et al*., 2021). MSMEs have an important role in the national economy, providing jobs and contributing to the Gross Domestic Product. MSMEs can deal with various types of uncertainty in the inputs and outputs produced. According to the Dinas Koperasi Usaha Kecil dan Menengah Provinsi Jawa Tengah (2021), it is known that there are 2,654 SMEs in Sukoharjo District.

One of them is Sumber Rejeki, or "Suki," a cottage industry located in the rural area of Tawangsari Sukoharjo. The Sumber Rejeki was founded in 2018 and has opened up job opportunities for the surrounding residents so that the business is used as the daily livelihood of the village community to meet the living needs of its workers. In addition, the products produced by the Sumber Rejeki have become the village's superior products. They have succeeded in encouraging the community's economy and the potential of SMEs in the village. Sumber Rejeki indirectly also plays a role in accelerating village development. The product produced by Sumber Rejeki is a snack, namely basreng crackers.

Crackers are one type of snack known for a long time by most Indonesian people (Maisur *et al*., 2019) that have a low density, shaft, and crunchy texture (Pakpahan & Nelinda, 2019). Crackers are very popular and can be a side dish for food (Wahyuningtyas & Kumala, 2017). When bitten, crackers can cause an acoustic sensation (Pakpahan & Nelinda, 2019). In addition, crackers have an economical price (Abriana & Indrawati, 2020). The affordable price makes this snack a prima donna for entrepreneurs and consumers (Artiningsih *et al*., 2020). Crackers have various types based on their raw materials, such as fish crackers and

shrimp crackers (Rahmayani *et al*., 2018). Many types of crackers are circulating in the community such as onion crackers, fish crackers, shrimp crackers, and others (Hartati, 2017).

Crackers are one type of dry food (Engelen & Angelia, 2018). The ingredients used to make crackers consist of raw materials and additives. The raw materials used must contain enough starch (Maisur et al., 2019) because crackers are a type of small food that can experience volume increase (Engelen & Angelia, 2018); for example, tapioca flour, wheat flour, sago flour, and rice flour. An animal or fish can be raw material to add flavor to make crackers (Maisur *et al*., 2019).

Based on the shape, two kinds of crackers are made from tapioca, namely sliced crackers (in Palembang it is called "kemplang" crackers) and crackers that are molded like noodles and then formed into circles (noodle crackers). Based on the composition and flavoring ingredients, crackers have various types because it depends on the ingredients used. The most widely used filler material is tapioca flour, then additional ingredients include fish or shrimp, water, salt, and a little monosodium glutamate. Based on the composition of the used ingredients, the main content of crackers is starch, a little protein (derived from fish or shrimp), and several types of vitamins and minerals (derived from fish or shrimp). Crackers also have a variety of flavors, such as fish/shrimp crackers, noodle crackers, "gendar" crackers (made from rice), vegetable crackers, soybean crackers, and so on (Jamaluddin, 2018).

One of the crackers produced in the Sukoharjo District is fried meatball crackers, commonly known as basreng. Basreng crackers are produced by Sumber Rejeki and are named Kripik Basreng. Basreng is a cracker made from tapioca flour, noodles, and eggs. Basreng crackers on the market had a hard texture so it's difficult for everyone to eat them. Tapioca flour and eggs make basreng crispier (Kusnandar *et al*., 2021).

The production process is an activity to create or increase the use of goods or services by using factors such as raw materials, labor, machines, and funds so that they become more useful to meet the needs of human life (Herawati & Mulyani, 2016). Basreng production began with soaked egg noodles washed with water and then seasonings with garlic, salt, and flavorings after that mashed the dough. Then, mix a dough from chicken eggs, tapioca flour, egg noodles, and spices until molded. The dough is molded like a rice cake. The rice cake dough must be fried until brown then removed and drained. After the dough has cooled, then cut into thin so, we can next to the step to fry. The final step is weighed and packaged for marketing.

The stage of making cracker dough is a very important initial stage. The process of making dough starts with all the prepared ingredients then put into a container, then stirred until it is homogeneous (Rosiani *et al*., 2015). Sumber Rejeki makes a mixture of chicken eggs, tapioca flour, noodles, and seasonings manually. This causes the mixture and flavor of the spices to be uneven. In addition, it requires a lot of time and energy, so if the worker is not strong, the results are not smooth and difficult to shape. The process of making dough is shown in Figure 1.

Based on the explanation above, the problem faced by Sumber Rejeki is that the process of making dough is still manual, so it is not efficient in terms of labor and time. Workers who make the dough have limited energy, and the process of making dough repeatedly will cause the workforce to become tired. This condition causes the process of mixing and stirring the raw materials to be uneven so that the dough is smooth and the taste is uneven. The time required for manual dough making takes 30 minutes for every 1 ingredient recipe (± 5 kg). They often can't fulfill the target if they get orders in large quantities and the turnaround time is short. This condition causes reduce the opportunity to make a profit. This service activity aims to develop Sumber Rejeki to improve production and use appropriate technology. According to Anam *et al*., (2021), the application of appropriate technology is a technology under the SME-level industry that can answer community problems, is environmentally friendly, can be utilized by the community easily, and produces added value from economic and environmental aspects.

METHOD

Community service activities held in April 2021 at the Sumber Rejeki SMEs in Majasto Village, Tawangsari Sub-district, and Sukoharjo Districts. SMEs face the problems

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identified above, so the solution offered is to introduce appropriate technology which is carried out in a participatory way between the community service team and Sumber Rejeki SMEs. Other community service teams have adopted this participatory method, written by Purnamaningsih *et al*., (2021) and Triwibowo (2021). The application of appropriate technology in the form of a dough kneading machine is carried out so that SMEs can produce in more capacity. Besides, it is more efficient in time, effort, and cost (Riptanti & Anam, 2016).

The steps for introducing appropriate technology are in the form of a dough mixer machine, including:

(a) The community service team identifies the manual production process of basreng crackers. The manual production processes are detailed to know the suitable machine for this activity. Detail identified the basreng cracker production in Figure 1. According to Anam *et al*., (2021), machine identification is carefully carried out because the appropriate technology applied to the partner industry can have a significant impact.

(b) The community service team discussed the various types of dough mixers on the market and compared the advantages and disadvantages of each type with partner SMEs. According to Fatchurrohmah et al., (2017), the discussion method is closely related to problem-solving, which involves activity, so this method is very good to apply.

(c) The service team and partner of SMEs design a dough kneading machine based on the discussion results and agree on the type of dough kneading machine needed. According to Wasisto *et al*., (2016), the design process uses brainstorming to get ideas to find solutions.

(d) The community service team ordered a machine design at an engineering workshop. Because the workshop will make it easier if there is a revision of the mixer machine; the engineering workshop can still repair it as needed (Figure 3).

(e) The community service team introduced and practiced how to use and maintain the dough kneading machine to Sumber Rejeki SMEs. The community service team also handed over the dough mixer machine.

(f) The SMEs use dough kneading machines to make basreng crackers dough.

(g) The community service team monitor, assist, and evaluate the use of the dough kneading machine.

RESULT AND DISCUSSION

Socialization

Socialization is the first step taken by the community service team in implementing the community partnership program. According to Kusnandar, Harisudin, Adi, et al., (2021), the socialization of activities to SMEs is usually conducting gatherings, introducing and explains about the program of activities that will be carried out. The socialization activity explains the activities that will be carried out to overcome the problem faced by SMEs, along with explaining the timing of their implementation. The problem is Sumber Rejeki SMEs still make dough manually, so it is not efficient in terms of time and labor. Manual mixing of raw materials causes the dough to be less smooth and have an uneven taste. The activity that will be carried out to overcome the problem is introducing appropriate technology in the form of a dough kneading mixer machine. The private socialization with the head of Sumber Rejeki SMEs can be seen in Figure 4.

Figure 1. Manual dough-making process

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Figure 2. Discussing with Sumber Rejeki SMEs

Figure 4. The socialization activity in Sumber Rejeki SMEs

Figure 3. Making a dough kneading machine

Figure 5. The activity of making dough

Introduction of Dough Mixer Machine at Sumber Rejeki SMEs

Making basreng crackers by Sumber Rejeki SMEs is done manually by mixing and stirring all the ingredients, so it takes a lot of time and effort, and the mixture is uneven (Figure 5). The solution to this problem is by introducing appropriate technology such as dough mixers. With dough mixer, mixing and kneading becomes more efficient, and the work is faster because the energy needed has been replaced by using machine power.

The dough mixer has dimensions of an elbow frame of 50 x 60 x 45 cm, a stainless steel tank with a diameter of 25 cm x 56 cm, a stirrer as a stainless steel 25.4 mm, 1/2 Horse Power engine, V belt transmission, 5 kg capacity (Figure 6). The machine's capacity is as much as 5 kg because it is adjusted to the conditions of the electrical power installed in the home of the partner SME, which is 900 watts. The engine capacity cannot be more than 5 kg because it follows the amount of electric power installed so that if it exceeds, the electric power must also be the same, because it can lead to cost inefficiencies. After all, if you increase the electric power, the production costs will also be even greater in terms of paying for the electricity load.

The appropriate technology in the dough kneading machine at Sumber Rejeki differs from the previous technology. For example, the structural design of the onion cracker dough mixer is limited to the main components, namely the mixing bowl, mixing spoon, transmission system, and frame. The mixing

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tank is box-shaped and without a lid (Ledianti *et al*., 2021). The "ampiang" dough kneading machine is made in the form of a finned mixer/doughnut with a portable system equipped with a rubber drive wheel so that it can be moved (Sulistyo & Yudo, 2019). The dough mixer machine at Sumber Rejeki MSMEs is a tubular mixer with a lid at the top so that the rotation of the mixing spoon can easily reach all sides of the mixing tub and the dough does not squirt out of the container when the machine is operated.

The dough mixer is made with a combination of connected fin models and a box-shaped mixer, so it is expected to be maximized during the mixing process. This machine also crushes wet noodles so they are perfectly mixed with other ingredients. In addition, the machine uses electric power with ½ Horse Power for a capacity of 5 kg for 5 minutes, because it adapts to the electric power of MSMEs, which is 900 watts. This is different from Kriswanto *et al*., (2019) use of a cake dough mixer machine to produce dry "bakpia" cakes. The engine uses a 5.5 hp gasoline motor with a capacity of 6 kg for 5 minutes. The speed is lowered using a pulley system comparison to get large torque at low-speed gasoline motors.

In the introduction session, the community service team explained how to use the machine, maintain the machine, and clean the machine after use. It affects machines that are durable and have a relatively long economic life (Parnanto *et al*., 2019). The introduction of the machine by mixing the dough in as much as one recipe consisting of 3 kg of tapioca flour, 1 kg of egg noodles, 0.5 kg of chicken eggs, salt, and seasonings, usually takes about 30 minutes manually. This dough kneading machine only takes 5 minutes per recipe. This machine can mix as many as 40 recipes or the equivalent of 200 kg of raw materials to meet sudden requests. Based on these conditions, the mixing time of the dough becomes more efficient, and the labor produced by the workers is lighter or less and can produce in more capacity. Figure 7 is a step to use a dough machine when mixing the ingredients for basreng crackers.

Sumber Rejeki SMEs using this dough kneading machine did not encounter any problems. This is because using the machine is quite easy, according to the Standard Operating Procedure (SOP), in operating the machine. After using the machine, the partner cleaned it until it was completely clean to avoid any remnants of material that could cause rust on the stainless. It is very important to maintain hygiene in the food production to be under the good food processing procedure (CPPB) (Widyasari *et al*., 2021).

Figure 6. The dough mixer machine introduced to Sumber Rejeki SMEs

Figure 7. Mixing of dough using a kneading machine at Sumber Rejeki SMEs

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Table 1. Evaluation of community service activity results

Number	Explanation	Before Activity	After Activity
1.	Dough making process	The process of mixing and stirring is done manually (by hand) and takes 30 minutes for one ingredient recipe (± 5 kg).	The mixing and stirring process is done with a machine. It takes 5 minutes for one ingredient recipe (± 5 kg).
2.	Production capacity per day	Maximum 10 recipes or equivalent to 50 kg of ingredients	Maximum 40 recipes or equivalent to 200 kg of ingredients
3.	Labor	The labor is easily tiring because the mixing and kneading of the dough are based on hand strength.	The workforce is not easily tired because mixing and kneading dough uses electricity, so it can be left to do other work.
4.	Average labor operating costs	Per recipe IDR 5,000	Per recipe IDR 3,000
5.	The average electricity cost of using a dough kneading machine	IDR 0	IDR 4.500/ Day
6.	Dough result finishing	The dough results are not evenly mixed because using hands, it can be mixed carelessly so the results is not smooth.	The dough is evenly mixed and smooth

Monitoring and Evaluation

The application of this dough mixer machine needs to be assessed for indicators of success so that it is measurable. For the community service team, it is an important thing as a learning process and can apply in other places that have similar cases. For Sumber Rejeki SMEs had benefits directly and measure production capacity daily. For SMEs with the same line of business, this can be an example of using this technology to be applied in the production process. Table 1 describes an evaluation of activities carried out by the community service team.

Table 1 shows the evaluation of service activities results, which show that there are changes for the better for Sumber Rejeki SMEs before and after service activities. Based on interviews with workers and owners of Sumber Rejeki SMEs, applying appropriate technology for basreng cracker dough kneading machine is very beneficial for partner SMEs. The introduction and use of machines make Sumber Rejeki SMEs manage their businesses more efficiently. Sumber Rejeki SMEs can increase their production capacity and expand their marketing area. These SMEs also no longer refuse orders in large quantities that require fast completion. The following is a concise business analysis based on output data and daily production costs.

Business Assistance

Assistance for Sumber Rejeki SMEs is carried out by the Community Service Team once a month, either by visiting the business location or online (zooming). The aim is to monitor the activities of SMEs after they have introduced the machine. The partner SMEs are expected and become independent and successful (Figure 8). Assistance includes (1) assistance in the production process so that the dough still has good quality. (2) Assistance when partner MSMEs experience technical problems related to the use of tools or business problems so that even though the program of activities has been completed, the partnership is still established.

The service team assisted and discovered a new problem regarding the inconsistent quality of tapioca flour to partner. An increase follows increased production capacity in need for tapioca flour raw materials, but sometimes the results are not as expected. SMEs use tapioca flour with the "bola" brand. The flour brand is the same, but the results of basreng crackers are sometimes less than the usual production average. This condition needs to be discussed with the supplier of raw materials so that the production results are consistent.

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Table 2. A concise business analysis

Number	Explanation	Without of Dough Kneading Machine	Uses of Dough Kneading Machine
1.	Output	43 kg @ IDR 31,000	60 kg @ IDR 31,000
2.	Average Revenue per day	IDR 1,328.571	IDR 1,860,000
3.	Average cost per day	IDR 1,294,127	IDR 1,621,000
4.	Profit	IDR 34,444	IDR 239,000

Figure 8. Assistance to Sumber Rejeki SMEs

Impact and benefits of activities

This service activity has impacted and benefits SMEs: (1) SMEs have increased knowledge about how to use appropriate dough-making technology. SMEs initially only knew the production process manually and became aware of the development of appropriate technology that can increase efficiency in the production process by 80-90%. (2) SMEs gain additional knowledge about maintenance procedures for appropriate technology. SMEs initially never knew how to maintain tools and became aware of the procedures for maintaining appropriate technology. They can carry out the production process in good condition. (3) Production capacity will increase by 60 – 75%, and the marketing area will be wider.

CONCLUSION

Service activities at the SME Sumber Rejeki can overcome the problem of manually mixing the dough. The team introduced the dough kneading machine based on SMEs' needs and resource capabilities. As a result, SME Sumber Rejeki can use and care for the machine properly. This has an impact on increasing efficiency in the production process by 80-90%, increasing production capacity by four times daily, saving on labor costs, and getting better dough quality.

ACKNOWLEDGEMENT

The Community Service Team from the Agribusiness Innovation Management Research Group would like to thank to Institutions of Research and Community Development of Universitas Sebelas Maret (LPPM UNS). Many thanks for the grant of community partnership program non-state budget UNS community service. The Community Service Team also thanked Sumber Rejeki SMEs for actively participating and successful activities.

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