

Increasing Production of the Meatball Business Using an Automatic Meatball Machine

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Article Info	Abstract
Article history: Received: August 29, 2024 Accepted: July 8, 2025 Published: December 20, 2025 Keywords: Meatball Meatball printer Production This article is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License © 2025 Bubungan Tinggi: Jurnal Pengabdian Masyarakat	Meatballs are very popular with everyone, from children to adults. In the process of printing meatballs into rounds, Meatball Wilujeng UMKM still uses it manually. Wilujeng meatballs are hand-made into meatball molds. In the molding process, it takes about 60 minutes to produce 9 kg of dough, which will form about 900 meatballs. The already-formed meatball is not uniform when hanging by a fist, and when picking up the dough with a spoon. This is the main problem in making meatballs. To overcome this, a tool was designed to automatically and efficiently make meatballs. So that this tool will ease and speed up the process of making meatballs for Wilujeng meatballs. The purpose of this service activity is to increase the meatball business's production by designing an energy-efficient, appropriately sized automatic meatball machine. The design of the meatball machine results in dimensions (D x W x H x H) of 25×15×70, a voltage of 15V, and a power of 370 W. It can produce 20 kg of dough in just 10 minutes, making 333 meatballs, resulting in a 122% increase using the % efficiency formula. To cite this article: Mediaswanti, K. A., Asnah, A., Widyastuti, F. K., & Anggraini, S. P. A. (2025). Increasing production of the meatball business using an automatic meatball machine. <i>Bubungan Tinggi: Jurnal Pengabdian Masyarakat</i>, 7(4), 838-849.

INTRODUCTION

In Indonesia's economic development, the government pays close attention to MSMEs. One of the Wilujeng meatball MSMEs is a micro, small, and medium enterprises (MSMEs) engaged in the culinary sector, especially the production and sale of meatballs. Wilujeng meatballs are known for their unique taste and exceptional product quality.

In an effort to increase competitiveness and expand the market, Wilujeng Meatballs recognizes the importance of implementing an effective technological tool to boost meatball production amid fierce competition among meatball traders.

Meatballs are made from meat, and choosing the right tools is an important factor in making them. The selection of machines for making meatballs and their supporting equipment has a significant influence on production results, both in terms of quality and quantity ([Saputro & Nadliroh, 2022](#)). The right machine ensures the resulting meatballs have a consistent texture, uniform size, and optimal flavor ([Nadliroh et al., 2023](#)). In addition, efficient machines can increase production capacity and reduce the time and effort required for the manufacturing process ([Melvi et al., 2021](#)).

Some factors to consider in the selection of machinery and equipment for making meatballs include: (1) Raw material: the machine must be suitable for the type of raw materials used so as not to damage the texture and flavor of the meatballs ([Anindyajati et al., 2022](#)); (2) Production capacity: machines with capacities that match production needs will maximize operational efficiency ([Megawati et al., 2020](#)); (3) Ease of use and maintenance: easy-to-operate and maintainable machines reduce *downtime* and improve production continuity ([Tito et al., 2023](#)); (4) Final product quality: the right machine will ensure that the meatball is of high quality and consistent in terms of taste, texture, and size ([Herlambang et al., 2019](#)); and (5) Energy efficiency: energy-efficient machines can reduce operational costs ([Ayu, 2018](#)).

The owner and business leader of Wilujeng meatball is Eko Setyo Wahono, and his wife, Djuwati, is the treasurer. This business began in 2008. The products produced by these UMKM partners are meatballs and fried foods. Although it has been in operation for approximately 16 years, the production process, especially printing, is still done manually with hands and spoons, as shown in Figure 1.



Figure 1 The process of printing meatballs using fists

In Figure 1, it appears that the partner only uses his hands to make meatball molds. Molding meatballs from 9 kg of dough takes about 60 minutes. Thus, 900 meatballs will be produced from 9 kg of dough in 60 minutes. Already-formed meatballs are not uniform when picking up the dough, depending on the fist and the spoon. To solve this problem, the solution offered to partners is to use an automatic meatball machine to achieve greater uniformity and save significant time.

The novelty of this automatic meatball machine compared to other meatball machines is that it offers three mold sizes and shapes and produces 1,998 meatballs per hour. Meanwhile, the meatball machine was designed by [Segara et al. \(2021\)](#) produces around 300 meatballs per hour with two mold shapes. So, it is more effective and has a greater variety of mold sizes and shapes. In addition, the designer Achmad Arizal Alwi et al. [Alwi & Istiqlaliyah \(2022\)](#) state that the meatball machine is equipped with two mold hole sizes, 20 mm and 30 mm, with a capacity of 2 kg per process. To advance the current culinary industry and increase meatball production, it is essential to design automated meatball machines to accelerate printing and reduce energy consumption ([Segara et al., 2021](#)). This community service activity aims to increase meatball production by designing an automatic meatball machine with effective, efficient dimensions and energy use.

METHODS

The method used in this activity is a five-stage community service implementation framework: socialization, training, technology application, mentoring and evaluation, and program sustainability. At this stage of socialization, the service team provided socialization on how to operate the tool and the maintenance of the meatball machine, namely starting from the preparation of ingredients such as meatball dough, setting the

machine for the desired size, the printing process, with the stages of how to operate the tool, and the safety of use. Then, socialize tool maintenance, such as routine cleaning, periodic checks, lubrication of moving parts, especially on motor parts and printer blades, and replacement of spare parts, by providing information about the signs that spare parts need to be replaced and where partners can get original spare parts.

At the training stage, the community service team provides a simulation of operations and maintenance by conducting a direct demonstration of the tool's operation and maintenance, so partners better understand how the machine works. Furthermore, discussion, questions, and answers can be facilitated by opening a session for partners to ask any questions about the use and maintenance of the machine.

At the technology application stage, the service team provides partners with opportunities to use meatball machines by focusing on automated systems, such as automatic cutting and setting the size and quantity of meatballs to be printed. As well as paying attention to the material to be printed so it does not run out, as this will affect the size of the meatball mold. In addition, partners also pay attention to machine maintenance, including automatic system inspection and cleaning, and checking other components of hoppers and automatic size molds.

At this stage of mentoring and evaluation, the service team assists with operating the meatball machine and evaluates to ensure the tool's system continues to run correctly, and checks the size and shape of the meatballs produced against the size of the meatball mold.

At the sustainability stage, the program aims to ensure that investments in technology continue to provide long-term benefits to businesses and support sustainable growth. Routine monitoring and evaluation are conducted through a performance reporting system, in which partners report the machine's effectiveness, any performance declines, and potential problems to be addressed. Conduct a technology audit at least once a year to ensure that tools are functioning correctly and remain up to date with evolving production needs. Provide video tutorials and an online platform where partners can get the latest information on equipment operations and maintenance independently.

To increase the production of Wilujeng Meatball UMKM, there are several service activities carried out from the following steps:

- Initial Survey of Production Needs and Capacity

Steps:

1. Identification based on needs: Hold meetings with Bakso Wilujeng UMKM owners to understand their current production process needs and challenges.
2. Production Capacity Analysis: Surveying the existing production capacity, including the number of meatballs produced per day and the time required for each process.
3. Evaluation of Existing Equipment: Identify equipment currently used for meatball production, including manual meatball printers with spoons.

Questionnaires and Interviews: Using questionnaires and interviews to collect data on the desirability and ability to invest in new equipment. Questionnaires were given to customers after they enjoyed meatball dishes, and the community service team also completed the questionnaires in the form of forms. There are four types of questionnaires given, including

- a Cleanliness of the production site and process, consisting of components of the cleanliness of the production site, cleanliness of cooking utensils, use of gloves and masks, food storage, and quality of raw materials (carried out by the community service team). There are five correspondents.
- b. Customer satisfaction with several components of the assessment, namely assessing taste, service satisfaction, cleanliness of the food place, comfortable

atmosphere of the dining place, speed of service, and friendliness and professional attitude of employees. The number of correspondents is 30.

- c. Taste quality with the following assessment aspects: price according to the quality of taste and service, menu variety, possibility of you coming back, and recommending meatball food to others. The number of correspondents is 30.
- d. Serving dishes with the following components: serving dishes on time (not waiting long), cleanliness of the food served is well maintained, clean serving utensils, serving utensils according to the dish, and serving utensils are safe to use (not damaged). And 25 people as correspondents.

Furthermore, the interview was conducted by the community service team for Wilujeng meatball UMKM, which focused on increasing business results, turnover, conducting a SWOT analysis, developing a strategy, and assessing the extent of understanding of food processing, sanitation, and hygiene. In addition, the team reviewed the results of *e-commerce activities* implemented through Shopee, Instagram, and TikTok that have been registered.

- Meatball Machine Selection

Steps:

1. Feasibility Analysis: Assess the feasibility of using machines based on UMKM production needs, budget, and operational capabilities.
2. Discussion with UMKM Owners: Hold discussions with UMKM owners to discuss the results of the meatball machine design desired by Wilujeng Meatball UMKM and discuss recommended tool options.

- Machine Design

At this design stage, the service team designed a machine made of sturdy stainless steel that resists rust. Appliance dimension size (D x W x H): 25 x 15 x 70. Voltage 15 V and power 370 W. Funnel capacity: 5 kg. Chasing 0.6 mm thick. Threaded shaft 16 mm. Dynamo 1/2 hp (more powerful than 1/4). Equipped with three kinds of mold sizes, namely 2 cm, 2.5 cm, and 3 cm. The size of the meatballs produced will be uniform. The uneven size reduces the appeal of the meatballs. Meatball machines can improve the meatball printing process by making it more effective and efficient (see Figure 2).

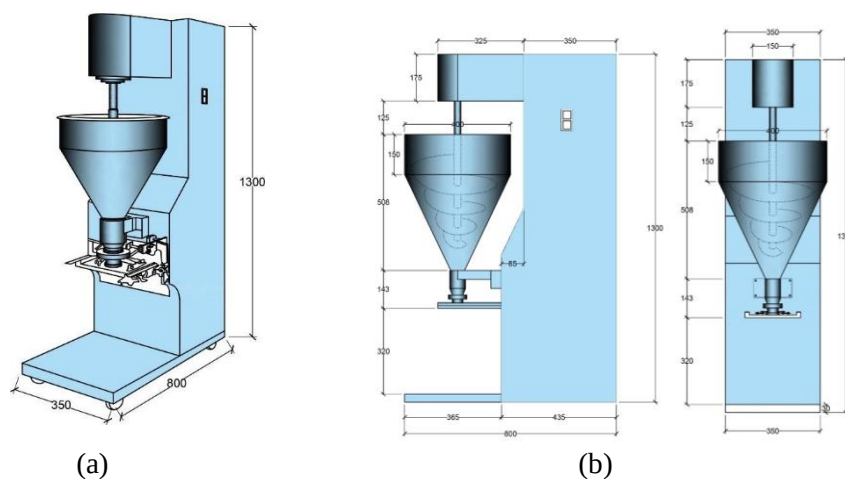


Figure 2 (a) Meatball machine design and (b) Detailed design of meatball machine modification specifications

Figure 2 shows that this meatball machine can be used easily and quickly, with maximum results, making it more effective and efficient. With faster production, 20 kg of dough takes only 10 minutes to produce. In addition, using an automatic meatball printer can save labor costs or employee salaries. Using this tool makes it easier and faster to work and yields more meatballs. The manufacturing process with the tool results in meatballs with a more precise, uniform size and shape.

Followed by several trainings. Theoretical and practical methods are used to carry out the training. In the theory session, partners receive an in-depth explanation of the machine and the procedures to be followed. The practical session involves employees using the meatball machine under the guidance of the implementation team. These trainings include:

- Machine Use and Maintenance Training.
 - Steps:
 1. Introduction of meatball printing tools: Explain the main components of the meatball machine, their respective functions, and the working principle of the tool.
 2. Standard Operating Procedures (SOP): Includes the steps for using the tool, from preparation and setting the size and shape of the meatballs to the printing process.
 3. Meatball machine operational training: Hold training sessions for employees as production operators on how to use the meatball machines correctly.
 4. Occupational safety: An explanation of safety procedures when operating the appliance, such as the use of PPE (personal protective equipment), material handling, and how to prevent accidents
 5. Care and maintenance: Tips for keeping the tool in good condition, including regular cleaning and inspection of tool components to ensure longer machine life and efficient operation ([Prasetyo & Nadliroh, 2022](#)).
 6. *Basic troubleshooting*: Techniques to identify and address common problems that occur with meatball machines.
 7. Usage manual: Provides manuals for use and maintenance in print and digital form.
 8. Production simulation: Conduct sessions with new machines to ensure all employees understand the process.
- Monitoring and Evaluation of Machine Use
 - Steps:
 1. Initial supervision: Perform supervisions during the first few weeks after the appliance is in use to ensure proper use ([Kurnia & Istiqlaliyah, 2022](#)).
 2. Collect production data: Collect data on increased production capacity, meatball quality, and time efficiency after the use of the meatball machine.
 3. *Feedback* from employees: Conduct *feedback* sessions with employees and UMKM owners to identify challenges and problems they face ([Habibah et al., 2024](#)).
 4. Evaluation of results: Conduct a comprehensive assessment of the meatball machine's effectiveness in improving production and product quality.
- Mentoring and Follow-up
 - Steps:
 1. Follow-up mentoring: Providing ongoing mentoring to UMKM in the form of additional consultation and training if needed.
 2. Process optimization: Provide additional guidance or training to improve machine utilization and the overall production process.
 3. Periodic review: Conduct reviews every 2-3 months to evaluate the machine's sustainability and its impact on the business.

4. Documentation of success: Documenting the results and progress achieved as a reference for further development and as an example of best practices for other UMKM ([Londa et al., 2023](#)).

RESULTS AND DISCUSSION

The results of implementing this community service activity include the handover of meatball-printing equipment, with modifications for three different print sizes, to Mr. Eko, the business leader and owner of the Wilujeng meatball business.

In addition to providing meatball machines, partners received training on operating and maintaining them. The training was conducted with several meatball production operators, as well as Mr. Eko, the business owner. Then training is provided on how to maintain the meatball machine regularly, making it more durable, less prone to damage, and more efficient.

This meatball machine is designed to meet the food industry's need to produce meatballs in bulk with high efficiency. The main purpose of this design is to

- Increase productivity by enabling the production of large quantities of meatballs in a short period of time.
- Time and labor efficiency can be achieved by reducing the time and labor required for meatball production, thereby improving operational efficiency.
- Consistent product quality by producing meatballs of uniform size and weight to ensure consistent product quality.

Machine design specifications

- Production capacity: 20 kg of dough within 10 minutes.
- Production output: 333 meatball pieces in 10 minutes, with uniform size and weight.
- Machine-making material: Made of food-grade stainless steel material to ensure food safety and the durability of the machine.
- Dimensions and design: Compact with ergonomic design for easy operation and cleaning. Tool dimensions (D x W x H) 25 x 15 x 70. Voltage 15 V and power 370 W.

Main components of a meatball machine

- Drive motor: Using a powerful and efficient electric motor to drive the whole molding mechanism.
- Molding mechanism: Specially designed to shape dough into meatballs automatically, with adjustable settings for different sizes.
- Dough feeder system: An automatic feeder system that ensures a constant and even flow of dough to the molding mechanism ([Sugiyanto & Mubtadi, 2018](#)).
- Speed setting: Has adjustable speed settings to control the production rate as required.

How the meatball machine works

- Dough filling: The meatball dough is fed into the hopper (dough feeder container) machine.
- Automatic feeding: The dough is automatically fed into the molding mechanism at the set speed.
- Meatball forming: The molding mechanism shapes the dough into meatballs of the desired size. There are three sizes of meatball mold: 2 cm, 2.5 cm, and 3 cm.
- Product dispensing: The formed meatballs are dispensed through the output line and can be directly accommodated into a container filled with clean water.

Design test and evaluation results

The test results of the meatball machine show satisfactory performance according to the designed specifications:

- Production capacity achieved: The machine printed 333 meatballs from 20 kg of dough in 10 minutes, or 1,998 grains per hour, meeting the production target.
- Product consistency: All meatballs produced have uniform size and weight, indicating the machine maintains product quality.
- Energy efficiency: Efficient use of electrical energy with a motor designed for continuous operation without *overheating*.
- Ease of operation and maintenance: The machine is easy to operate and clean, reducing maintenance downtime.

Engine Design Advantages

- High production speed: This machine allows the production of large quantities of meatballs quickly, which is important for meeting high market demand.
- Precision in size and weight: Producing meatballs of consistent dimensions and weight is essential to meeting product quality standards.
- Ergonomic and user-friendly design: Makes it easy for employees to operate and maintain the machine.
- Durability: Uses high-quality materials that are resistant to corrosion and mechanical damage.

Training and mentoring results

The results of this training showed a significant improvement in the operational skills of Wilujeng meatball employees. Some of the important points achieved from the training results are

1. Increased production efficiency:
Employees can use the meatball machine more quickly and efficiently after learning the correct technique. Production time can be reduced by reducing operational errors.
2. Reduction of machine breakdowns:
By understanding proper operational procedures and machine maintenance, damage caused by human error can be significantly reduced.
3. Increased work safety: Understanding occupational safety helps reduce the risk of accidents during machine operation. Participants are more aware of the importance of using PPE and safety procedures.
4. Faster troubleshooting: Trained employees are better prepared to handle basic technical problems and can make simple repairs without stopping production.

Meatball machine operation training is shown in Figure 3.



Figure 3 Meatball machine operational training

In Figure 3, the implementation team provides training and support to partners on operating a meatball machine. During the training, the service implementation team provided a guidebook on using and maintaining the meatball machine. Employees who have received training then carried out production simulations. This is done to ensure that employees in the printing department can carry out their tasks independently and sustainably without fear of making mistakes. The meatball mold is shown in Figure 4.



Figure 4 Meatball mold

Figure 4 shows the results of a meatball machine that produces completely round, uniform meatballs. Producing meatballs from 20 kg of dough takes only 10 minutes and yields up to 333 meatballs, increasing mold output by 122%.

Meatball machine operational training aims to improve participants' skills and knowledge in using meatball machines effectively and efficiently ([Tentama et al., 2022](#)). This training covers how machines work, safety procedures, maintenance, and basic troubleshooting.

The next step is to monitor and evaluate the use of meatball machines periodically. Conduct periodic evaluations to ensure that the skills taught are practiced correctly in the field ([Dewi et al., 2023](#)). Conducting periodic monitoring and evaluation of machine operations, meatball machine maintenance, and technology audits once a year to ensure that the machine is still operating properly ([Patintingan et al., 2022](#)).

With regular monitoring and evaluation, problems with the meatball machine, such as decreased performance, minor damage, or accumulation of leftover dough, can be detected early before they become more serious. Regular evaluations enable preventive maintenance, such as lubricating moving components and replacing parts that are beginning to wear out. This extends the machine's life and reduces the frequency of major breakdowns. Damage detected early is usually cheaper to repair than major damage that requires replacing a major part or a new tool ([Hartono & Setyowidodo, 2022](#)). A well-maintained engine tends to use more energy efficiently, which can reduce daily operating costs ([Segara et al., 2021](#)).

CONCLUSION

The design of the meatball machine, capable of producing 20 kg of dough in 10 minutes and 333 meatballs or 1,998 grains per hour, shows very satisfactory performance. The design of this tool can increase meatball yield by 122%. It is designed to improve production efficiency, reduce labor requirements, and ensure consistency of product quality. Several things must be done to ensure business sustainability; namely, it is necessary to conduct further evaluation over a long period to test the tool's overall performance. Multiple evaluations are required for specialized skills training in

equipment operation and maintenance. There is a need to invest in engine maintenance to prevent easy damage.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

Conceptualization, K.A.M. and S.P.A.A.; methodology, A.; formal analysis, F.K.W.; writing—preparation of the original draft, S.P.A.A. All of authors have contributed substantially to the reported work.

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