



Introducing Lean Manufacturing to Enhance Competitiveness of the Rendang Gadih SME in Payakumbuh

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ABSTRACT

Small and Medium Enterprises (SMEs) are the backbone of Indonesia's economy, contributing over 60% to the national GDP and employing more than 97% of the workforce. In Payakumbuh, culinary SMEs have significant potential due to the abundance of local raw materials and high demand for traditional foods such as rendang. Rendang Gadih is one such SME focusing on rendang production for both local and regional markets. However, inefficiencies in production, inconsistent quality, and manual management processes limit its competitiveness. This community service activity introduced the concept of Lean Manufacturing to improve efficiency and reduce waste. The main tools socialized were Value Stream Mapping (VSM), Process Activity Mapping (PAM), and identification of the eight types of waste, along with the application of Kaizen principles for continuous improvement. Implementation was carried out through preparation, socialization, and evaluation stages. The results of this activity are expected to help Rendang Gadih enhance production efficiency, minimize waste, and strengthen competitiveness, serving as a model for other culinary SMEs in West Sumatra.

Keywords: lean manufacturing, SME, value stream mapping, process activity mapping, 8 waste of lean

INTRODUCTION

Small and Medium Enterprises (SMEs) are the foundation of Indonesia's economy, contributing over 60% of the national GDP and employing more than 97% of the workforce (Ayuningtyas, 2024). In regional contexts, SMEs not only strengthen local economic structures but also preserve cultural identity. Payakumbuh, West Sumatra, has strong potential in the culinary sector due to local ingredient availability and the popularity of traditional foods, particularly rendang. Known as the 'City of Rendang,' Payakumbuh hosts numerous small businesses specializing in rendang production (Rahmail, 2023). Rendang Gadih is one such SME producing rendang for local and external markets (Rendang Gadih, 2025). Despite its potential, Rendang Gadih faces several operational challenges, including inefficient production processes, inconsistent product quality, manual record-keeping, and limited marketing strategies. These issues reduce productivity and hinder competitiveness against larger producers that have adopted modern technologies and quality management

systems. From the production floor, many non-value-added activities remain. For example, long waiting times between ingredient preparation and cooking, the use of imprecise raw materials, and time-consuming manual packaging. All of these are forms of waste that reduce efficiency. Without system improvements, these conditions risk hampering business development and reducing Rendang Gadih competitiveness.

To address these challenges, Lean Manufacturing offers an effective solution (Brianti & Nuswantara, 2024). Based on prior research (Bhamu & Sangwan, 2014), the idea of implementing LM has not been embraced by most SMEs because they do not yet understand the concept of LM well, resulting in concerns regarding the costs of LM implementation and a skepticism towards the benefits of LM for businesses. Meanwhile, based on exploration of LM penetration in several SMEs in India (Panizzolo, Garengo, Sharma, & Gore, 2012), it was found that the implementation of LM strategies significantly increased the performance of SME production processes. In this community service activity, several lean manufacturing tools will be socialized to the SME. Key Lean tools include Value Stream Mapping (VSM), which visualizes the process and the value from the beginning to the end of process; Process Activity Mapping (PAM), which classifies value-added and non-value-added activities; and identification of the eight types of waste. The socialization of these concepts is critical for SMEs to improve operational performance and sustainability.

The objective of this community service program is to enhance the understanding and readiness of Rendang Gadih in adopting Lean Manufacturing principles by introducing practical and easy-to-apply lean tools suited to the SME context. Specifically, this program aims to identify sources of waste within the production process, increase awareness of value-added activities, and provide initial guidance for improving process efficiency and consistency without requiring significant capital investment. Through this program, Rendang Gadih is expected to be able to optimize resources, shorten process time, and achieve consistent quality. The novelty of this community service activity lies in the contextualized application of Lean Manufacturing socialization in a traditional food-based SME, particularly rendang production, which is characterized by manual processes and cultural production practices. Unlike conventional Lean Manufacturing applications in large-scale or manufacturing-oriented industries, this program integrates lean tools such as VSM, PAM, and 8 Waste Identification in a simplified and practical manner aligned with the operational realities of micro-scale food enterprises. This approach not only bridges the gap between Lean Manufacturing theory and SME practice but also contributes a socialization model for similar culinary SMEs in Indonesia.

METHOD

This community service activity held in the production house of Rendang Gadih, Payakumbuh, West Sumatra. The activity was implemented in three stages: preparation, implementation, and evaluation.

1. Preparation

Administrative coordination with the UMKM owner was carried out, including setting the activity schedule and conducting preliminary interviews to understand the production system and efficiency-related challenges. This stage helped align the socialization materials with partner needs.

2. Implementation

Lean Manufacturing socialization was conducted through interactive sessions involving the owner and employees of Rendang Gadih. The sessions covered Lean principles, identification of non-value-added activities, and practical use of VSM, PAM, and 8 Waste identification. After the material socialization session, direct observations were conducted on the production floor to see the actual work process, identification of value-added and non-value-added activities was demonstrated, and several examples of the application of lean principles in production activities was described. Students assisted in observation and documentation as part of experiential learning to support the MBKM policy. Key tools of Lean Manufacturing that were socialized includes:

- Value Stream Mapping (VSM)

VSM is a visual method for mapping the value stream from the beginning to the end of the production process, including the flow of materials and information from each workstation (Lestari & Susandi, 2019). The following is a VSM template to be designed.

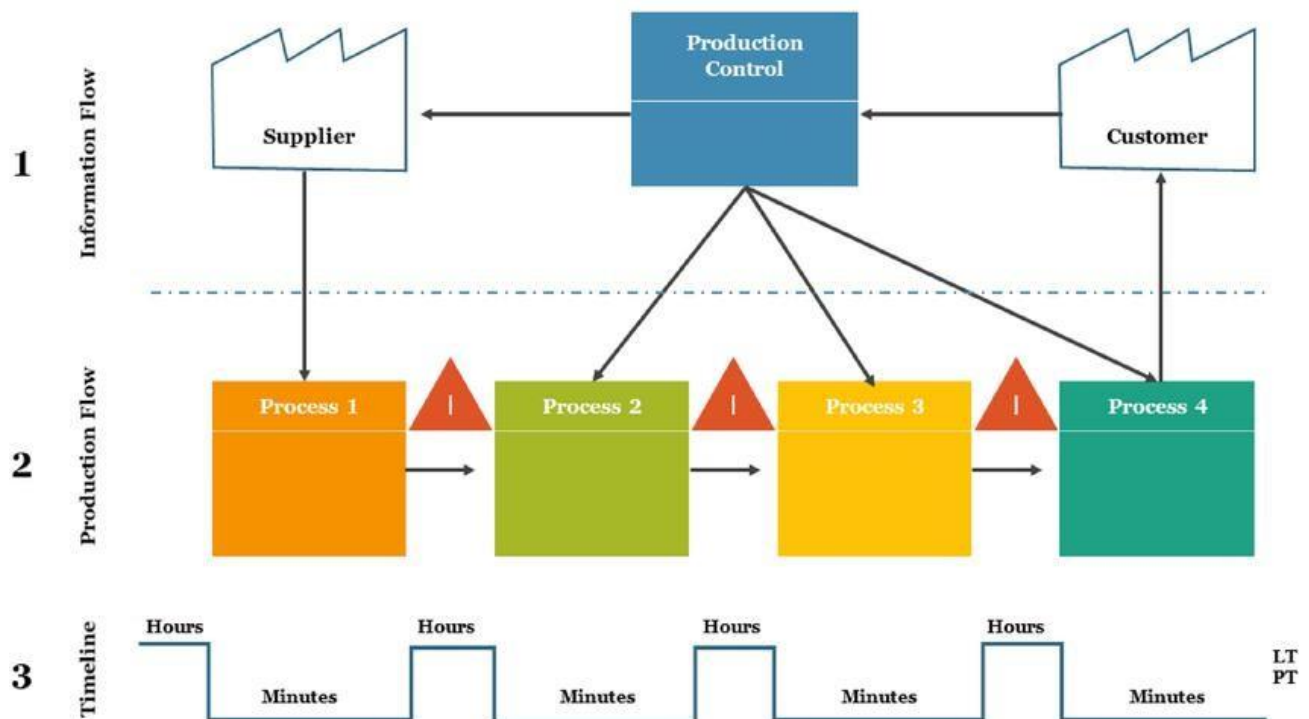


Figure 1. VSM template

Source: (Anupama, Anand, Ramkrishnan, & Harikrishnan, 2023)

- Process Activity Mapping (PAM)

PAM is a tool for mapping overall production activities through a table and classifying them according to activity type and category (Zulfikar & Rachman, 2020). PAM is used to categorize activities into value-added activities, non-value-added activities, and necessary non-value-added activities.

- Waste of Lean

Waste is anything that does not add value to the product. Generally, there are eight types of waste in lean manufacturing. Prior research conducted on SME shows the effectiveness on classifying waste into these eight categories (Ariyadi, Farid, Junayat, Khumaira, & Reynaldo, 2025), which include:

- Defects: damaged or non-conforming products.
- Extra Processing: processes or activities that do not add value.
- Overproduction: producing more than is needed.

- Waiting: operators, machines, or materials waiting for the next process.
- Inventory: the accumulation of raw materials, work-in-progress, and finished goods.
- Transportation: waste resulting from inefficient transportation.
- Motion: the movement of people or machines that does not add value.
- Unutilized Talent: not placing workers according to their skills.

3. Evaluation

The evaluation assessed participants' understanding and readiness to apply Lean principles. Feedback was collected through discussions and interviews with the business owner. Table 1 shows the timeline of the community service activities on the site.

Table 1. Timeline of the community service activities

No	Activity	Time
1	Lean Manufacturing Materials Socialization: - Lean principles - Identification of non-value-added activities - Practical use of VSM, PAM, and 8 Waste identification - Question-and-Answer Session	2:00 – 3:00 PM
2	Direct Observation of the Production Floor	3:00 – 3:30 PM
3	Post-Observation Question-and-Answer Session and Interactive Discussion	3:30 – 4:00 PM
4	Evaluation and Post-Activities Interview with the SME Owner	4:00 – 4:30 PM

RESULTS AND DISCUSSION

Lean Manufacturing Socialization

The socialization activity was conducted by Industrial Engineering lecturers at Andalas University through an educational session at the Rendang Gaduh SME production house. The educational session included a lecture, a visual presentation of the VSM, PAM, and 8 Waste tools, and a question-and-answer session. The socialization activity successfully increased SME owners' and employees' understanding of the basic concepts of Lean Manufacturing, the importance of process efficiency, and waste identification techniques using the key tools.

Participants were given a detailed explanation of the use of the VSM and PAM tools. The VSM material covered how to map the company's value stream, the symbols used in VSM, and the calculation of the VAR (value-added ratio). The PAM presentation explained how to classify activity types (operations, transportation, inspection, delays, and storage), determine value-added (VA), non-value-added (NVA), and necessary non-value-added (NNVA) activities, and classify NVA and NNVA activities into waste types based on the 8 wastes of lean. Finally, the Kaizen concept was explained as a foundation for companies to continuously improve. Participants gained new insights into how lean work systems can increase productivity and reduce operational costs.



Figure 2. Lean manufacturing education after-session documentation

Direct Observation of the Production Floor

The community service team, along with the SME team, conducted observations in the production area to identify real-world examples of wasteful activities such as waiting times, inefficient movements, or excess material use. Based on these observations, the team provided examples of simple and applicable solutions that SME can implement immediately, such as adjusting work area layouts, standardizing packaging processes, and recording workflows.



Figure 3. Production floor observation - initial processing of beef, chicken, and mushrooms



Figure 4. Production floor observation - rendang and sambal production process



Figure 5. Production floor observation - product packaging process

Post-Observation Question-and-Answer Session and Interactive Discussion

The question-and-answer session was held to provide a space for owner and employees to share questions and challenges they encountered in implementing Lean. This session fostered an exchange of ideas between the community service team and the SMEs to find solutions that suited their business conditions.



Figure 6. Post-observation question-and-answer session and interactive discussion

Evaluation and Post-Activities Interview with the SME Owner

The evaluative interview was conducted to determine the level of understanding and readiness of Rendang Gadih to adopt Lean Manufacturing principles. The interview was conducted by an Industrial Engineering lecturer from Universitas Andalas, with the resource person being Dedy Syandera Putera, the owner of the Rendang Gadih SME. The interview results yielded positive feedback, indicating that the Lean Manufacturing concept is relevant and beneficial for implementation within the SME. However, further guidance is still required, particularly in relation to the standardization of operating procedures and the systematic recording of production processes. Several obstacles were also identified, including limited human resources and challenges in implementing improvements amidst routine production activities.

These obstacles are aligned with recent studies on Lean Manufacturing adoption in SMEs, in which they report similar challenges to those expressed by the Rendang Gadih owner, thereby confirming that these obstacles are not unique to this case but widely recognized in academic literature. Research shows that a pervasive barrier for SMEs adopting Lean practices is the lack of adequate human resources, including skilled

personnel and expertise in Lean tools. Studies indicate that SMEs often struggle with limited internal capabilities to plan, coordinate, and carry out Lean improvements because they lack trained staff or sufficient workforce flexibility to support change initiatives. This limitation impacts an SME's ability to sustain Lean practices beyond initial training or socialization (Wani, Wei, Samat, & Abdullah, 2023). Literature also highlights that production demands and routine operational workload significantly constrain Lean implementation in SMEs. Because most employees are fully engaged in day-to-day tasks, there is often insufficient time for improvement activities, training, or systematic waste analysis, which can slow or limit the execution of Lean projects. This aligns with the SME owner's observation that improvements often compete with regular production duties (Alkhoraif, Rashid, & McLaughlin, 2019). Other studies further discuss how organizational culture and employee resistance present additional challenges. When employees are unfamiliar with Lean or perceive continuous improvement efforts as extra work without immediate benefits, resistance can occur, creating further obstacles to sustained implementation (Wardhani & Realita, 2022).

The community service program outcomes indicate that the socialization of Lean Manufacturing has positively impacted Rendang Gadih's understanding of efficient production and waste elimination. Through the introduction of practical tools such as Value Stream Mapping (VSM), Process Activity Mapping (PAM), and 8 Waste Identification, the SME owner and participants gained applicable knowledge to better analyze process flow, identify non-value-added activities, and improve resource utilization. These outcomes demonstrate that the program successfully enhanced awareness and initial capability in applying Lean Manufacturing concepts within the SME context.

To ensure the sustainability and long-term impact of the program, several strategies for program continuation are proposed. These include the future research on conducting VSM, PAM, and 8 Waste Identification, periodic mentoring and follow-up visits by the Industrial Engineering team to monitor implementation progress and address emerging challenges. Collaboration between the SME and Universitas Andalas may be strengthened through future community service programs or applied research initiatives, thereby supporting continuous improvement and reinforcing the SME's competitiveness through sustained Lean Manufacturing implementation.



Figure 7. Post-activities interview session with the SME owner

CONCLUSION

The socialization of Lean Manufacturing has positively impacted Rendang Gadih's understanding of efficient production and waste elimination. Through tools such as VSM, PAM, and 8 Waste Identification, participants gained practical knowledge to improve process flow and resource utilization. This activity contributes to enhancing the competitiveness of SMEs in the culinary sector and aligns with the goals of higher education community engagement and the MBKM program. Further mentoring is recommended to implement Lean Manufacturing principles consistently and achieve sustainable business improvement.

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REFERENCES

- Alkhoraiif, A., Rashid, H., & McLaughlin, P. (2019). Lean implementation in small and medium enterprises: Literature review. *Operations Research Perspectives*, 6.
- Anupama, V. M., Anand, K. B., Ramkrishnan, R., & Harikrishnan, A. K. (2023). Application of lean principles for efficiency enhancement of BIM process. *Journal of Civil Engineering*.
- Ariyadi, M. C., Farid, M., Junayat, F. S., Khumaira, S. Z., & Reynaldo, A. B. (2025). Identifikasi dan Analisis Pemborosan pada Rantai Proses Produksi Menggunakan Metode Fishbone dan Diagram Pareto di UMKM Tahu Ajo Sukabumi. *YUME : Journal of Management*, 8(1), 311-324.
- Ayuningtyas, A. D. (2024, July 8). Berapa Besar Kontribusi UMKM Atas PDB Indonesia? Retrieved from GoodStats: https://goodstats.id/article/berapa-banyak-kontribusi-umkm-atas-pdb-indonesia-iZgHK?utm_source=chatgpt.com
- Bhamu, J., & Sangwan, K. S. (2014). Lean manufacturing: Literature review and research issues. *IJOPM*, 34(7), 876-940.
- Brianti, F. R., & Nuswantara, D. A. (2024). Lean Manufacturing dalam UMKM untuk Mengurangi Waste, Waktu, dan Biaya (Studi Kasus pada Bisnis Online Dreamyspace). *Journal of Innovation Research and Knowledge*, 885-896.
- Lestari, K., & Susandi, D. (2019). Penerapan Lean Manufacturing untuk mengidentifikasi waste pada proses produksi kain knitting di lantai produksi PT. XYZ. *Prosiding Industrial Research Workshop and National Seminar*. Bandung.
- Panizzolo, R., Garengo, P., Sharma, M., & Gore, A. (2012). Lean manufacturing in developing countries: evidence from Indian SMEs. *Production Planning & Control: The Management of Operations*, 23(10-11), 769-788.

- Rahmail, N. (2023, August 25). Payakumbuh City of Randang, Tempat Penghasil Rendang Yang Lezat. Retrieved from Basangek.com: <https://basangek.com/payakumbuh-city-of-randang-tempat-penghasil-rendang-yang-lezat/>
- Rendang Gadih. (2025, September). Rendang Gadih. Retrieved from Rendang Gadih: <https://www.rendanggadiah.com>
- Wani, Z. K., Wei, Y. W., Samat, H. A., & Abdullah, A. B. (2023). Lean Principles in Small-Medium Enterprises in Malaysia: Creating A Web-Based Training. *Journal of Advanced Industrial Technology and Application*, 4(1), 46-55.
- Wardhani, M. I., & Realita, T. N. (2022). 5S As a Form of Lean Manufacturing Implementation in the Perspective of Human Resources: A Case Study in Food SMEs. *SOSMANIORA (Jurnal Ilmu Sosial dan Humaniora)*, 1(4), 599-605.
- Zulfikar, A. M., & Rachman, T. (2020). Penerapan Value Stream Mapping dan Process Activity Mapping untuk Identifikasi dan Minimasi 7 Waste pada Proses Produksi Sepatu X di PT. PAI. *Jurnal Inovisi*, 16(1), 13-24.

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