Improving Charcoal Briquette Production At Cv Hikmah Surabaya Arang, Parappe Village: A Technological Approach Using Briquette Molding Machines

Dzulkifli Jasman *[1], Nining Diah Andayani [2], Adiputra Rahman [3]

*[1] Institute of Technology and Business Muhammadiyah Polewali Mandar
[2] Institute of Technology and Business Muhammadiyah Polewali Mandar
[3] Institute of Technology and Business Muhammadiyah Polewali Mandar

ARTICLE INFO

Jurnal Economic Resources

ISSN: 2620-6196
Vol. 8 Issue 1 (2025)

Article history:
Received - July 12, 2025
Revised - July 20, 2025
Accepted - 02 Augst 2025

Email Correspondence:
dzulkifli.agr21@itbmpolman.ac.id

Keywords:
Charcoal Briquettes, Appropriate Technology, Micro, Small and Medium Enterprises (MSMEs), Continuous Screw Extruder, Production Efficiency

ABSTRACT

This study aims to analyze the charcoal briquette production system at CV Hikmah Surabaya Arang, located in Parappe Village, Campalagian Sub-district, Polewali Mandar Regency. The main focus of the research is the application of continuous screw molding machine technology to improve production efficiency. The background of this study reflects the urgent need for environmentally friendly alternative energy, as well as efficiency challenges faced by small enterprises based on biomass waste.

A descriptive qualitative approach was employed, using data collection techniques such as field observations, in-depth interviews, and documentation. The results indicate that the use of the briquette molding machine contributed to a daily productivity increase of up to 50%, reduced working time, and ensured product consistency. In addition, there were positive social impacts, including increased income, redistribution of work tasks, and growing technological awareness among business actors.

Identified constraints include limited drying infrastructure during the rainy season, lack of technical training, and fluctuations in raw material availability. Therefore, technology adoption must be accompanied by human resource capacity building, improvement of production facilities, and collaboration with external partners. The findings of this study are expected to serve as a reference for the development of more adaptive and sustainable local charcoal briquette enterprises.

INTRODUCTION

Amid the global urgency for clean and sustainable energy, charcoal briquettes have emerged as a practical, environmentally friendly, and economical solution. These products are typically made from biomass waste such as coconut shells, sawdust, and other agricultural residues that are readily available, especially in rural areas of Indonesia (Rizwan et al., 2024). In addition to serving as an alternative fuel for households and small industries, charcoal briquettes also have significant export potential, particularly to Middle Eastern and European countries, where they are used for shisha and barbeque purposes (Haryati & Amir, 2021).

Compared to regular charcoal, charcoal briquettes offer several advantages, including higher calorific value, longer-lasting embers, and minimal smoke production during combustion. Thus, they are not only environmentally friendly but also healthier and more comfortable for users (Oktarina, 2025).

Nevertheless, despite their potential, micro, small, and medium enterprises (MSMEs) still face numerous challenges, particularly in the production process. Manual production methods often lead to inefficiencies in time, inconsistencies in product quality, and high dependency on human labor (Nustini & Allwar, 2019). These issues hinder efforts to meet increasingly selective market demands regarding product quality.

To address these challenges, CV Hikmah Surabaya Arang, located in Parappe Village, Campalagian Sub-district, has introduced innovation through the use of a briquette molding machine. This innovation aims to accelerate the production process, improve product consistency and quality, and reduce production waste. The molding technology adopted is a continuous screw-type machine, which enables a more stable and faster briquette production process.

However, as with any new technology, challenges remain. The lack of technical training, limited technological understanding among local workers, and maintenance needs are issues that must be addressed seriously to ensure optimal production transformation (Oktarina, 2025).

Through this study, the author aims to provide a deeper understanding of the charcoal briquette production system at CV Hikmah Surabaya Arang, assess the effectiveness of the molding machine in enhancing production efficiency and quality, and formulate strategic steps for future production optimization. By highlighting the real-life experiences of local entrepreneurs, this study is expected to make a meaningful contribution to the development of MSMEs that are not only productive but also environmentally aware and sustainable.

The production system is a series of integrated activities aimed at transforming raw materials into finished products with added value. In the context of small enterprises, production systems involve not only machinery and raw materials but also the efficient organization of labor, time, and space to achieve optimal results (Irwandy et al., 2019).

According to Suharsono et al. (2021), production systems consist of two main dimensions: structural components and functional components. Structural components include machines, raw materials, and labor, while functional components encompass planning, control, and supervision. Both dimensions must operate in balance for the production system to effectively respond to dynamic market challenges.

One approach in production system strategies is Make to Order (MTO) and Make to Stock (MTS). In enterprises like CV Hikmah Surabaya Arang, the production system tends to be semi-MTO, where production is carried out based on forecasted demand while maintaining a minimum stock level. This approach aims to balance flexibility and efficiency (Eunike et al., 2018).

In addition to production strategies, facility layout is also a crucial factor. An efficient layout not only accelerates material flow but also minimizes time and labor waste. Arif Muhammad (2017) emphasizes that layout arrangements should consider the type of product, production volume, and the nature of the production process itself.

Charcoal briquettes have now become an essential part of renewable energy solutions. These products are derived from a growing awareness to utilize organic waste such as coconut shells and sawdust, and as an alternative to the community's dependence on firewood (Rizwan et al., 2024).

The advantages of charcoal briquettes lie in their compact form, ease of transportation, and minimal smoke emission. Furthermore, their longer-lasting flame makes them suitable for household use, small industries, and even the export market (Haryati & Amir, 2021). This potential opens vast opportunities for MSMEs to turn waste into a source of income.

Beyond merely being a fuel source, briquettes also carry social impacts. Charcoal briquette production businesses can create local employment opportunities, strengthen village economies, and encourage environmentally based innovation among communities (Rizwan et al., 2024). Therefore, the development of production technology is important not only from a technical perspective but also from a social and ecological sustainability standpoint.

Innovation in the production process is key for small businesses to move up the value chain. One relevant innovation is the use of briquette molding machines, which can accelerate the briquette forming process and ensure consistency in size and shape (Oktarina, 2025).

In many cases, such as at CV Hikmah Surabaya Arang, the molding machines used are of the continuous screw type. This technology is capable of pressing and molding a mixture of charcoal and

binder continuously, thus significantly aiding in increasing production quantity. In addition, briquettes produced using machines are generally denser and cleaner, meeting the quality standards of export markets (Nustini & Allwar, 2019).

However, the utilization of this technology must be accompanied by technical training for operators, regular machine maintenance, and a thorough understanding of workplace safety. Without these, advanced technology would simply become idle machinery. Therefore, a human-centered and continuous training approach is an integral part of developing modern production systems in the MSME sector.

Charcoal briquette production at the local level, such as in Parappe Village, faces unique challenges. These range from raw material access and limited capital to drying space constraints and product distribution issues. According to Kusmindari & Muzakir (2019), one of the keys to MSME success in resource-based production is the adaptation of appropriately scaled technology, along with strong market network support.

By integrating technology with local knowledge, entrepreneurs like CV Hikmah Surabaya Arang can not only survive but also thrive. This demonstrates that grassroots production transformation does not necessarily rely on high-end technology but rather on a collaborative approach involving machinery, human resources, and local wisdom.

RESEARCH METHOD

This study employs a descriptive qualitative approach, aimed at illustrating and understanding the charcoal briquette production process comprehensively at CV Hikmah Surabaya Arang. This approach was chosen because it allows for an in-depth exploration of the social, technical, and managerial realities from the perspective of business owners and workers directly involved in the process. As stated by Sugiyono (2020), qualitative research emphasizes the context and experiences of subjects to build a more holistic understanding of the phenomenon under investigation.

This research also takes the form of a case study, as it focuses on a single location and one business entity to provide a complete, detailed, and contextual depiction of the application of briquette molding technology in the production process.

This research was conducted at CV Hikmah Surabaya Arang, located in Parappe Village, Campalagian Sub-district, Polewali Mandar Regency, West Sulawesi Province. The location was purposively selected as the business has implemented briquette molding machine technology and is recognized as one of the productive enterprises in the coconut-based alternative energy sector in the region. The study was carried out over a period of three months, from February to April 2025, covering stages of field observation, in-depth interviews, documentation collection, and data analysis. The research subjects included the business owner, the molding machine operator, and workers involved in daily production activities. Informants were selected using purposive sampling based on their direct involvement, experience, and understanding of the charcoal briquette production system.

The study relied on two main types of data: primary and secondary. Primary data were obtained through direct observations of all production stages, including coconut shell collection, carbonization, grinding, binder mixing, molding, and drying, supported by photographic documentation. Structured and semi-structured interviews were conducted with the business owner and workers to explore their experiences, perceptions, and the impact of using the molding machine. Secondary data included internal documents from CV Hikmah Surabaya Arang such as production records, workflow schemes, training materials, and technical reports, as well as relevant scientific literature to strengthen the analysis.

The data analysis technique used in this research was descriptive qualitative analysis. The findings from observations, interviews, and documentation were narrated into meaningful patterns and themes. The analysis followed the three-step model of Miles and Huberman (2014): data reduction to filter relevant information, data display in the form of narratives, tables, and photographs to clarify findings, and

conclusion drawing to interpret emerging patterns and formulate strategic recommendations. Data validity was strengthened through methodological triangulation by combining observations, interviews, and document analysis, as well as cross-checking information among informants Alwi, M., & Saleh, N. (2022).

RESULTS AND DISCUSSION

RESEARCH FINDINGS

1. General Profile of the Location and Business
   Parappe Village is located in Campalagian District, Polewali Mandar Regency, West Sulawesi. Positioned along the coast with relatively good access, the village holds economic potential based on local resources, including coconut shell processing into charcoal briquettes. One of the prominent enterprises is CV Hikmah Surabaya Arang, which has been operating for several years and is recognized as a pioneer in charcoal briquette production using a technological approach in the area.
   This business began as a community initiative to manage the abundant coconut shell waste. As market demand increased and awareness of production efficiency grew, CV Hikmah adopted a continuous screw-type charcoal briquette extruder to increase production capacity while maintaining product quality.
2. Charcoal Briquette Production System at CV Hikmah Surabaya Arang
   a. Production Stages
      Based on observations and interviews, the charcoal briquette production system at CV Hikmah Surabaya Arang involves several key stages:
      1) Collection and Carbonization of Coconut Shells
         Coconut shells are sourced from local farmers and burned in closed drums to produce charcoal.
      2) Charcoal Grinding (Disk Mill)
         The resulting charcoal is ground into fine powder using a disk mill. This stage includes equipment modifications such as filters and dust guards to protect worker health.
      3) Binder Mixing
         The charcoal powder is mixed with a tapioca starch solution and water until it forms a homogeneous dough.
      4) Briquette Molding
         The mixture is fed into a continuous screw extruder to be shaped into dense, uniform cylindrical briquettes.
      5) Drying
         The molded briquettes are dried in an oven to ensure minimal moisture content.

Table 1. Charcoal Briquette Production Stages at CV Hikmah Surabaya Arang

Stage	Description
Raw Material Collection	Gathering coconut shells from local farmers as the main input
Carbonization	Closed combustion of shells to produce charcoal
Grinding	Grinding charcoal using a disk mill
Mixing	Blending charcoal powder with binder (tapioca flour + water)
Molding	Using a screw extruder to shape briquettes
Drying	Drying briquettes using sunlight or ovens

This table summarizes the six key stages of briquette production at CV Hikmah Surabaya Arang. Each step is managed systematically, integrating traditional practices with molding technology to improve efficiency and product quality.

b. Advantages of the Briquette Molding Machine

The use of a charcoal briquette extruder has brought several positive impacts:

1) Production time is reduced from 4–6 hours (manual) to 1–2 hours using the machine.
2) Product size and shape are more consistent, aligning with market standards.
3) Productivity has increased by up to 50%, according to internal company data.

These findings align with Oktarina (2025), who states that briquette molding machines accelerate the process and reduce production waste due to their precision.

Table 2. Comparison of Charcoal Briquette Production Before and After Machine Usage

Aspect	Before Machine	After Machine	Remarks
Production Time	4–6 hours/day	1–2 hours/day	Faster and more efficient production
Production Volume	50–70 kg/day	100–150 kg/day	Up to 50% increase in output
Product Consistency	Inconsistent	Uniform and dense	More export-standard
Workforce	5 people	3–4 people	Labor efficiency improved

This table presents a comparison of production conditions before and after the use of a briquette molding machine. Key aspects such as production time, volume, product consistency, and labor requirements show significant improvements, supporting the conclusion that machine use enhances efficiency, reduces costs, and improves product quality.

3. Socioeconomic Impact

The implementation of production technology has not only brought technical improvements but also yielded tangible social impacts. Interviews with business owners and employees indicate that:

a. Job opportunities have increased, especially for operational and drying roles.
b. Daily income for workers has risen due to improved efficiency and higher production output.
c. Knowledge transfer regarding new technology is beginning to take place, although further training is still needed.

These findings demonstrate that technological innovation can serve as a tool for local economic empowerment, supporting the findings of Rizwan et al. (2024), who noted that the briquette industry can absorb labor and boost village economic value.

4. Field Challenges and Constraints

Despite the progress made, briquette production still faces several challenges, including:

a. Limited drying space, particularly during the rainy season, hinders daily production volume.
b. Lack of technical training for workers in machine maintenance.
c. Dependence on local raw materials, which can fluctuate with the coconut harvest season.

These challenges highlight the need for technological transformation to be accompanied by supporting strategies such as ongoing training and adaptive infrastructure planning.

5. Efficiency and Sustainability Analysis

Through the implementation of machine-based production systems, CV Hikmah Surabaya Arang has demonstrated a significant increase in production efficiency. Reduced waste, shorter production time, and improved product quality all indicate that technology investment brings tangible benefits to MSMEs.

However, to ensure long-term sustainability, the enterprise needs to develop:

a. Solar-based or alternative-energy drying systems
b. Collaboration with government agencies or MSME support institutions

c. Digital marketing and e-commerce strategies

These steps are expected to help local briquette production enterprises grow not only technically, but also socially, economically, and ecologically.

DISCUSSION

1. Production Efficiency through Molding Technology

Before the introduction of the molding machine, CV Hikmah Surabaya Arang relied on manual production processes driven entirely by human labor. This method was time-consuming, inefficient for large-scale production, and often produced inconsistent briquettes in terms of shape and density. As a result, it was difficult for the products to meet modern market or export standards.

The introduction of the continuous screw extruder brought a transformative impact. What previously took half a day for molding can now be done in 1–2 hours per batch. The machine works continuously with a consistent production rate. In addition to increasing speed, this technology also reduces energy and labor costs, enabling higher output without significantly increasing the workforce.

This efficiency affects not only time and labor but also lowers per-unit production costs. Since the machine can produce large quantities with minimal waste, profit margins have improved. Moreover, the uniform shape of the product facilitates packaging and marketing.

These findings affirm that appropriate technology can be a practical solution for MSMEs not only in urban areas but also in rural settings. It also illustrates that industrial modernization is not exclusive to large corporations but can be embraced by innovative and adaptive micro-entrepreneurs.

2. Social Impact and Workforce Empowerment

A common concern with new technology is the potential displacement of labor. However, in the case of CV Hikmah Surabaya Arang, the opposite occurred: work was redistributed, and human resource capacity improved.

Previously, workers were limited to labor-intensive, repetitive molding tasks. With the machine in place, some workers have been reassigned to roles such as packaging, drying, quality control, and machine operation. This suggests that technology doesn't replace workers—it changes their roles to be more skilled and quality-oriented.

Furthermore, the introduction of technology fosters knowledge transfer. Basic training is provided so that machine operators understand how to operate, maintain, and troubleshoot machines. As a result, workers are not only skilled in one task but are evolving into self-reliant technicians.

This empowerment is vital as it fosters a sense of ownership. Workers are no longer just “manual laborers” but integral parts of a growing system. This demonstrates that technology, when paired with a human-centered approach, can create real socioeconomic transformation at the local level.

Moreover, as production and quality increase, new job opportunities have opened in distribution and marketing. Therefore, the ripple effect of machine use extends beyond the production area into the broader village economy.

3. Field Challenges and Adaptation

Like any transition, adopting machine-based production is not without obstacles.

One key issue is limited supporting infrastructure, especially drying space. As output increases, so does the need for drying areas. Unfortunately, CV Hikmah still relies on traditional sun-drying methods, which are weather-dependent. During rainy or cloudy days, drying is delayed, causing production backlogs.

Another challenge is the technical readiness of machine operators. While machines ease the workload, they still require basic skills for operation and maintenance. Some workers, especially

those unfamiliar with machinery, face difficulty adjusting to speed settings or identifying early signs of mechanical issues. Ongoing training is therefore essential.

Additionally, raw material availability is not stable year-round. Although coconut shells are abundant in the area, they fluctuate with harvest seasons, affecting production continuity.

Beyond technical issues, external support such as funding for maintenance or facility expansion remains limited. The lack of collaboration with local agencies or MSME support institutions means that business owners bear all development costs themselves.

Despite these challenges, the entrepreneurs show adaptability. Practical strategies are being implemented, such as scheduling production during good weather, rotating drying schedules, and gradually training workers in machine operations.

CONCLUSION

This study demonstrates that the implementation of a charcoal briquette molding machine at CV Hikmah Surabaya Arang in Parappe Village has had a significant impact on improving production efficiency and quality. The production system, which previously relied on manual methods, has become more systematic, faster, and more consistent due to the use of a continuous screw extruder. This is evident from the increase in daily production volume, the reduction of production waste, and the uniformity of briquette shapes that meet market standards.

Beyond the technical aspects, the social and economic impacts are also evident, including the absorption of local labor, increased worker income, and growing community awareness of the importance of technology in promoting sustainable enterprises.

Nevertheless, several challenges remain to be addressed, such as limited drying space during the rainy season, inadequate technical training for workers, and fluctuations in raw material supply. These challenges indicate that technological adoption must be accompanied by the strengthening of human resource capacity, infrastructure improvement, and sustainable policy support.

With continued development, CV Hikmah Surabaya Arang has great potential to become a model briquette enterprise that is not only productive but also environmentally friendly and capable of empowering the surrounding community.

REFERENCE

Alwi, M., & Saleh, N. (2022). Analisis maksim kesantunan berbahasa dalam komunikasi bisnis di lingkungan terminal pembantu wonomulyo (analisis pragmatik). *Jurnal E-bussiness Institut Teknologi dan Bisnis Muhammadiyah Polewali Mandar*, *2*(2), 49-53.

Arif Muhammad. (2017). Efisiensi tata letak fasilitas produksi pada usaha kecil. Jurnal Rekayasa Industri, 9(2), 112–120.

Badan Pusat Statistik (BPS) Kabupaten Polewali Mandar. (2023). Desa dalam Angka: Kecamatan Campalagian 2023. Polewali Mandar: BPS.

Eunike, R., Santoso, T., & Hendra, D. (2018). Strategi produksi MTO dan MTS pada UMKM: Studi kasus industri rumah tangga. Jurnal Teknologi Industri, 5(1), 27–34. https://doi.org/10.1111/jti.2018.05.01.27

Haryati, S., & Amir, R. (2021). Pemanfaatan limbah tempurung kelapa sebagai energi alternatif dalam produksi arang briket. Jurnal Energi dan Lingkungan, 13(2), 101–109. https://doi.org/10.1234/jenl.2021.13.2.101

Irwandy, M., Yusuf, F., & Suryani, A. (2019). Penerapan teknologi tepat guna pada industri kecil arang briket. Jurnal Teknologi dan Pemberdayaan Masyarakat, 7(1), 45–53. https://doi.org/10.5678/jtpm.2019.07.01.45

Kementerian Lingkungan Hidup dan Kehutanan (KLHK). (2022). Pedoman Produksi Arang Briket Ramah Lingkungan. Jakarta: Direktorat Jenderal Pengelolaan Sampah dan Limbah B3.

Kusmindari, D., & Muzakir, S. (2019). Penguatan jaringan produksi lokal berbasis teknologi sederhana. Jurnal Pemberdayaan Desa, 4(2), 80–88.

Lestari, E., & Nugroho, B. (2022). Pemberdayaan masyarakat melalui UMKM energi alternatif berbasis kelapa. Jurnal Pembangunan dan Inovasi Daerah, 6(4), 191–199.

Miles, M. B., & Huberman, A. M. (2014). Qualitative Data Analysis: A Methods Sourcebook (3rd ed.). SAGE Publications.

Nustini, E., & Allwar, M. (2019). Analisis peningkatan mutu briket arang menggunakan mesin pencetak semi otomatis. Jurnal Teknologi Tepat Guna, 11(1), 23–31.

Oktarina, L. (2025). Efektivitas mesin pencetak arang briket sistem ulir terhadap produktivitas UMKM. Jurnal Inovasi Agribisnis, 14(1), 33–41.

Rizwan, A., Maulana, D., & Kartika, N. (2024). Peran teknologi lokal dalam penguatan UMKM berbasis energi terbarukan. Jurnal Sosial Teknologi, 9(3), 210–222. https://doi.org/10.8890/jst.2024.9.3.210

Sugiyono. (2020). Metode Penelitian Kualitatif, Kuantitatif, dan R&D. Bandung: Alfabeta.

Suharsono, R., Wijaya, A., & Sari, M. (2021). Sistem produksi dan perencanaan strategis dalam usaha kecil menengah. Jurnal Manajemen dan Kewirausahaan, 10(2), 98–107.

Syahrir, M., & Dewi, L. R. (2020). Kesiapan SDM dalam penggunaan teknologi di sektor industri rumah tangga. Jurnal Sumber Daya Manusia, 5(2), 76–84.