Integrated Material Center Business Model for Improving Financial Performance and Supply Chain Efficiency of Metal SMEs

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ABSTRACT

Small and Medium Enterprises (SMEs) in the metal industry in Mekarmaju Village, Bandung Regency, have great potential to support the local economy and the manufacturing industry supply chain. However, in practice, metal SMEs still face various structural problems. This study aims to examine financial performance due to the development of a business and operational model for a material center for SMEs in the metal industry. This study uses a qualitative descriptive approach. The data collection techniques used in this study are literature review, field observation, and focus group discussion. The data obtained was analyzed using qualitative descriptive analysis through the stages of data reduction, data presentation, and conclusion drawing. The results of the study show that the establishment of a material center with an integrated business model is an effective strategy to strengthen and develop metal SMEs. Through improvements in the supply chain, raw material management, logistics, warehousing, and the implementation of coordinated quality control, this model increases the efficiency, consistency of quality, and competitiveness of SME products. Its success is highly dependent on operational readiness, commitment to cooperation among stakeholders, and continuous assistance from the government, especially the role of the Ministry of Industry.

Keywords*: Business Model, Financial Performance, Material Center, Metal Industry, Supply Chain Integration.*

INTRODUCTION

The government formulated the 2015–2035 National Industrial Development Master Plan (*Rencana Induk Pembangunan Industri Nasional*/RIPIN), stipulated by Government Regulation Number 14 of 2015 as a mandate of Law Number 3 of 2014 concerning Industry, to guide industrial planning and development for government and industry players (Khattak et al., 2024). Within RIPIN, Small, Micro and Enterprise (SMEs) play a strategic role but face persistent challenges, particularly in raw material supply for iron-smith SMEs producing hoes in Mekarmaju Village, which stem from four main factors: availability, price and quality, standardization of dimensions, and fairness of distribution. To address these issues, the material center development focuses on strengthening the SME supply chain by ensuring efficient raw material flows, supporting economies of scale, and facilitating product distribution to consumers. To accelerate implementation, the Ministry of Industry must follow up on the 2018 study through three priority initiatives in 2019: technical assistance to build cooperation with buyers and raw material suppliers, preparation of both soft and hard infrastructure, and supply chain improvement support coordinated through the material center (Bekele et al., 2025).

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The mapping of infrastructure needs for the material center. In 2019, assistance activities prioritized securing commitments from buyers, particularly the Kawan Lama Group, and raw material distributors, alongside preparing the material center's infrastructure. Active follow-up by both the material center and the Ministry of Industry is essential to generate concrete outcomes, such as memorandums of understanding or cooperation agreements, given the material center's limited capacity when represented by village officials. The ministry supports these efforts through drafting agreements, facilitating meetings, and providing strategic input. Operational effectiveness further depends on mapping hard infrastructure (warehouses and transportation equipment) and soft infrastructure (SOPs and human resources), with the Ministry ensuring objectivity and supporting future infrastructure solutions (Ahmad et al., 2025).

Figure 1. Recommendations for Mapping the Infrastructure Needs of the Material Center

Figure 1 illustrates the follow-up work plan for the Mekarmaju Village Small and Medium Industries (*Industri Kecil dan Menengah*/IKM) Material Center. The ministry of industry's directorate of metal, machinery, electronics, and transportation equipment provides assistance in developing the business and operational model of the material center, guided by regulations such as the 2015-2035 national industrial development master plan, Law Number 3 of 2014 on Industry, Presidential Regulation Number 2 of 2018 on national industrial policy 2015-2019, and minister of industry regulation Number 21/M-IND/PER/2/2015 on the restructuring program for machinery and equipment for SMEs. To implement the material center effectively and support sustainable growth for metal tool and agricultural SMEs in Mekarmaju Village, a follow-up work plan was mapped out until April 2019, considering the village government's limitations, to ensure the center is ready to operate with adequate infrastructure, human resources, and institutional support.

Although various efforts have been made to strengthen the supply chain of metal SMEs, previous studies have paid little attention to evaluating the direct impact of developing a material center on SME financial performance (Shabbir et al., 2025). The novelty of this study lies in analyzing how the development of the business and operational model of the material center, including support in infrastructure, human resources, and cooperation with buyers and distributors, contributes to improving SME financial performance. Therefore, this study is expected to provide both practical and scientific insights regarding the relationship between institutional support, infrastructure readiness, and supply chain effectiveness on SME financial outcomes.

The relationship among the variables in this study can be described as follows: support from the Ministry of Industry and infrastructure readiness are key factors that influence the successful implementation of the material center and the effectiveness of the SME supply chain, which together contribute to improving the financial performance of SMEs. This emphasizes the importance of coordination among government institutions, infrastructure, and SMEs to achieve better efficiency, product quality, and competitiveness. Based on this phenomenon, the research problem is formulated as how

the development of the business and operational model of the material center can improve the financial performance of metal SMEs in Mekarmaju Village. The objective of this study is to analyze the impact of material center development on SME financial performance, considering the roles of institutional support, infrastructure readiness, and supply chain effectiveness as interrelated factors.

LITERATURE REVIEW

Institutional Support and SME Cluster Development in the Metal Industry

Small and Medium Enterprises (SMEs) form the backbone of economic development in both developed and developing countries. In Indonesia, SMEs account for over 98% of business units and significantly contribute to employment and GDP (Tambunan, 2009). Recognizing their strategic importance, the National Industrial Development Master Plan (RIPIN) 2015–2035 emphasizes SME development as a pathway to industrial competitiveness and inclusive growth. Industrial clustering is a key strategy for SME development, as it generates collective efficiency through local external economies and joint actions among firms (Schmitz, 1999). Clusters enable SMEs to achieve economies of scale in procurement, workforce sharing, and market access, enhancing competitiveness and reducing transaction costs (Schmitz, 1995; Sandee et al., 2002).

The metal industry SME cluster in Indonesia exhibits unique challenges compared to other manufacturing sectors, including high capital requirements, material quality standardization, supply consistency, and price volatility (Hayashi, 2002; Lewis & Olsson, 2022; Hariastuti et al., 2022; Rinawiyanti & Kusumo, 2023). These structural constraints often require collaborative solutions that individual SMEs cannot implement alone. Village-Owned Enterprises (*Badan Usaha Milik Desa*/BUMDes), established under Law Number 6 of 2014 and Minister of Villages Regulation Number 4 of 2015, serve as institutional mechanisms for local economic development, managing assets and conducting business for community welfare. By 2022, over 74,000 BUMDes were registered, though only 10% had legal entity certification. BUMDes performance is influenced by human and structural factors such as employee competence, ethical behavior, leadership, transparent communication, and incentive mechanisms, yet they face challenges in finance access and legal partnerships (Ridlwan, 2015; Sofyani et al., 2019).

Integrating BUMDes with SME clusters offers opportunities to connect small producers with broader markets and institutional support (Iskandar et al., 2021). However, BUMDes legal limitations may restrict formal commercial agreements, highlighting the potential need for subsidiary legal entities or cooperative structures. The study's framework combines supply chain management, economies of scale, and institutional economics to explain how centralized procurement, collective purchasing, and governance mechanisms enhance efficiency, reduce costs, and sustain long-term cooperation among SMEs.

Supply Chain Management, Material Centers, and Economies of Scale

Supply Chain Management (SCM) has emerged as a critical determinant of SME competitiveness and financial performance (Palguna et al., 2025). Thakkar et al. (2009) emphasized that effective SCM implementation enables SMEs to optimize inventory levels, reduce procurement costs, and improve delivery reliability. Studies indicate that operational improvements in supply chain efficiency directly enhance financial outcomes. Lee (2021) demonstrated that specific SCM strategies, including Vendor Managed Inventory (VMI), Enterprise Resource Planning (ERP), Collaborative Planning, Forecasting, and Replenishment (CPFR), and Warehouse Management Systems (WMS), positively impact both operational and financial performance, with organizational competencies mediating the relationship between SCM strategy and operational performance. However, SMEs face significant barriers to implementing sophisticated SCM practices, including limited financial resources, a lack of managerial expertise, inadequate information systems, and weak bargaining positions with suppliers and buyers

(Ellegaard, 2006; Gonçalves et al., 2024). Fawcett et al. (2008) noted that SMEs attempt to overcome these limitations by building deep supplier relationships, stabilizing supply chains, and reducing shortage risks, which underscores the importance of cooperative arrangements that enable SMEs to collectively address supply chain challenges.

Economies of scale are fundamental to understanding how aggregate purchasing benefits SMEs. Carpenter and Sanders (2007) noted that sources include bulk purchasing, managerial specialization, financial access, marketing cost distribution, and technological advantages. While individual SMEs cannot achieve these independently, collective arrangements such as material centers or purchasing cooperatives generate similar benefits. Wisner and Pearson (1993) distinguished volume economies from increased capacity utilization and learning economies from accumulated experience and improved skills; both arise when SMEs share resources and knowledge. The material center embodies these principles by centralizing procurement, warehousing, and distribution, serving as an integrated business model that addresses ecosystem gaps individual firms cannot bridge (Fadli et al., 2023; Wirati et al., 2024). It facilitates raw material aggregation, quality control, logistics, and market access, and prior research on collective facilities (*Unit Pelayanan Teknis*/UPT) shows positive impacts on cluster competitiveness and firm performance. This model addresses bottlenecks in material access, quality consistency, and market linkages that constrain metal SME development.

Financial Performance and Supply Chain Finance

Financial performance assessment in SMEs encompasses multiple dimensions, including profitability, liquidity, operational efficiency, and growth potential (Brigham et al., 2012; Rahiminezhad & Mokhatab, 2022). Key indicators commonly used to evaluate SME financial health include gross profit margin, net profit margin, Return On Investment (ROI), inventory turnover, working capital efficiency, and cash flow stability. These metrics provide insights into both short-term operational effectiveness and long-term sustainability. Supply chain interventions impact SME financial performance through multiple pathways (Jones et al., 2024). Le and Ikram (2022) documented that supply chain efficiency improvements directly affect SME profitability by reducing operational expenses, optimizing resource utilization, and accelerating order fulfillment. Siagian et al. (2021) further demonstrated that efficient supply chain operations contribute to higher profit margins, enhanced cash flow, and increased return on investment. These findings suggest that centralized supply chain facilities, such as material centers, can serve as catalysts for SME financial improvement.

Supply Chain Finance (SCF) has emerged as an innovative mechanism to address SME working capital constraints. SCF extends financing based on commercial relationships and transaction flows rather than traditional collateral requirements (Ullah et al., 2025). This approach is particularly relevant for SMEs that possess strong commercial relationships but lack conventional assets for securing loans. Deep-tier supply chain finance extends these benefits beyond first-tier suppliers to reach smaller firms further down the supply chain. Research on SCF impacts on SME financial performance indicates significant improvements in liquidity, working capital efficiency, and cash flow stability (Liu, 2025). However, adoption barriers persist, including limited awareness among SME managers, trust issues with financial institutions, regulatory challenges, and concerns about additional costs. The material center concept can potentially address some of these barriers by providing the documentation, transaction records, and relationship infrastructure necessary for SME participation in formal supply chain finance arrangements.

RESEARCH METHODS

This study employs a qualitative descriptive approach with the primary goal of gaining a thorough and detailed understanding of the current conditions, challenges, and requirements involved in developing a comprehensive business and operational model for a metal SME material center. This methodological choice was made because it allows

researchers to capture the phenomenon in a holistic manner, reflecting real field conditions and incorporating the diverse perspectives of stakeholders. Unlike quantitative approaches, this method does not rely on statistical hypothesis testing, making it particularly suitable for exploring complex, context-specific issues within SME operations and supply chain management.

The data collection process in this study involved multiple complementary techniques to ensure a broad and in-depth understanding of the subject matter. Firstly, a literature review was conducted to examine relevant theories, governmental policies, institutional frameworks, and prior research findings that are closely related to SME development, material center implementation, and supply chain optimization. Secondly, field observations were carried out to directly investigate the operational realities of metal SMEs, with attention given to production workflows, raw material procurement and management, inventory control, logistics and distribution systems, and supporting infrastructure. These observations provided critical insights into operational challenges, resource constraints, and areas where efficiency could be improved. Focus Group Discussions (FGDs) were conducted to engage SME actors, community representatives, and other stakeholders, allowing the collection of diverse perspectives, experiences, and suggestions. The FGDs facilitated collaborative dialogue, helping identify common needs and priorities that would inform the recommended model for the material center.

The collected data were analyzed using qualitative descriptive techniques through a structured process consisting of several stages. Data reduction involved sorting, organizing, and simplifying information according to the research focus. Data presentation consisted of compiling findings in a clear and systematic manner to facilitate understanding. Finally, conclusions were drawn by interpreting the results to produce a comprehensive picture of the existing situation, identifying key challenges, and formulating actionable recommendations for developing an effective, sustainable, and well-functioning metal SME material center.

RESULTS

Business Model Development and Financial Performance of the Material Center

The development of the Mekarmaju Village Metal SME Material Center business model was carried out to formulate a business framework capable of addressing the structural problems faced by SMEs, particularly those related to limitations in production planning, raw material procurement, logistics management, and product quality control and packaging (Yudhawati et al., 2024; Fadillah & Sofwan, 2025). This business model is designed not only as a production support facility but also as an integrated service hub that improves operational efficiency, quality assurance, and the competitiveness of metal SME products (Fadli et al., 2023). In this study, the development of the business model focuses on identifying the main functions of the material center, the relationships between services, and the sources of revenue that enable financial sustainability. In addition, the proposed business model also forms the basis for the preparation of financial performance simulations, particularly the profit and loss analysis of the material center. The mapping of the proposed business model and its components can be seen in Figure 2.

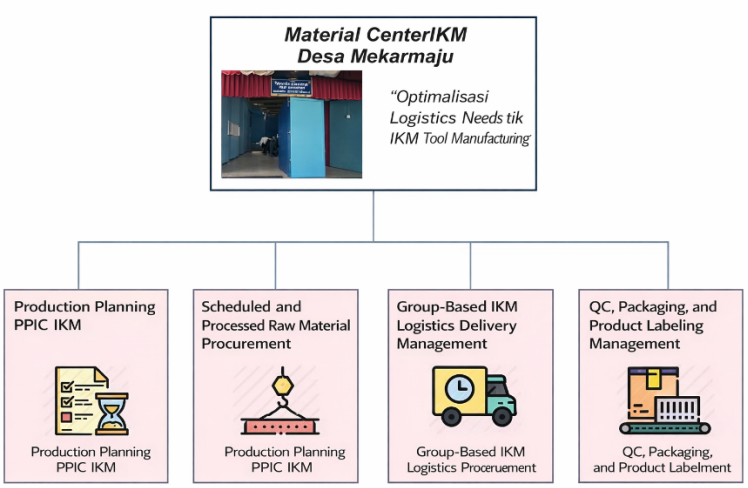


Figure 2. Proposed Business Model for the Material Center of the Mekarmaju Village SME

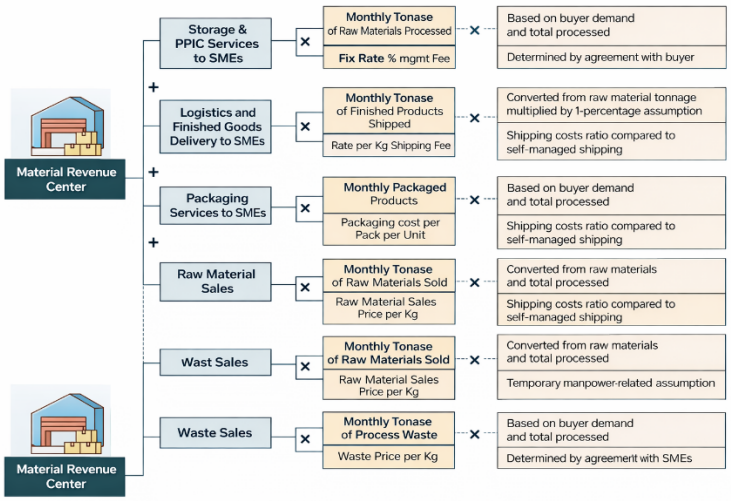


Figure 3. Revenue Component Mapping for Material Center Profit & Loss Simulation

Based on Figure 3, furthermore, to assess the financial feasibility of the proposed business model, the income components of the material center were mapped as a basis for preparing a profit and loss statement simulation. Each business model has its own characteristics and uniqueness designed to improve the effectiveness and efficiency of the supply chain between SMEs, suppliers, and buyers, while providing benefits to all stakeholders involved (Lenuwat et al., 2025). Therefore, the implementation of the Mekarmaju Village SME Material Center business model is aimed at strengthening coordination between business actors, reducing logistics costs, and improving the certainty of product quality and delivery timeliness.

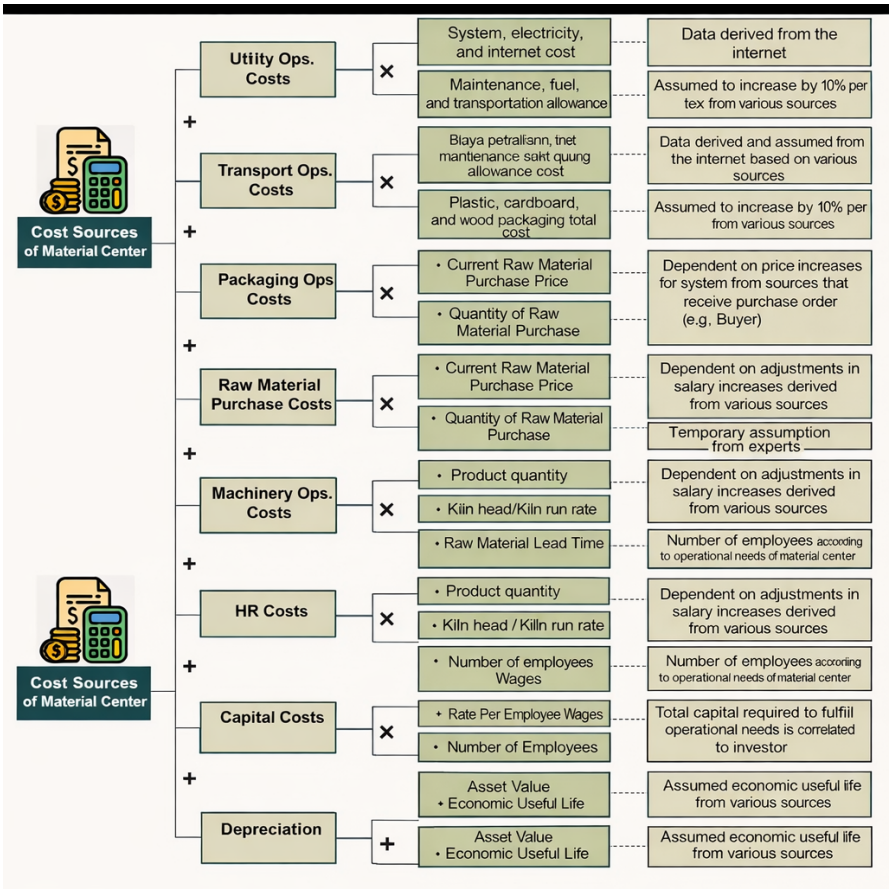


Figure 4. Cost Components in the Development of the Material Center Profit and Loss Simulation

Figure 4 presents the mapping of detailed cost components. Implementing this business model incurs costs to sustain the material center, making the identification of these components essential for financial performance simulations. The profit and loss simulation, calculated from the difference between revenue and operating costs, is based on assumptions using secondary data and the professional judgment of the authoring team, as the study did not include direct field surveys or primary data collection.

Table 1. Several Assumptions Used in Preparing the Profit and Loss Simulation

Category	Assumption	Unit	Value
Raw Material	Purchase price of prime raw material SPHC-PO	IDR/Kg	12,500
	Purchase price of secondary raw material pegas 2nd	IDR/Kg	8,000–10,000
	Selling margin for prime raw material	%/price	Max 10%
	Selling margin for secondary raw material	%/price	Max 10%
	Price increase adjustment	%/price	10%
	Buyer order increase adjustment	%/price	10%
HR & Administration	Average supervisor salary	IDR/month	~1,800,000
	Average warehouse operator salary	IDR/month	~1,200,000
	Number of warehouse operators	Persons	4–5
	Warehouse head salary	IDR/month	2,400,000
	Material Center administrator salary	IDR/month	~1,800,000
	Salary adjustment	%/year	10%
	Warehouse rent	IDR/year	10,000,000
SME & Operational	Total buyer product orders	Pieces/month	~6,000
	Total collector product orders	Pieces/month	~5,000
	Price of *cangkul* & *sekop*	IDR/Piece	45,000–50,000
	Labor cost	IDR/person	7,500

Category	Assumption	Unit	Value
	Transportation frequency	Shipments/month	6
	Management fee to SME	% of raw material cost	8%
	Logistics rate	IDR/Product	1,250
	Packaging rate	IDR/Product	1,500
Assumption	Total raw material managed	IDR/month	~233,000,000
	Total supporting materials	IDR/month	~93,500,000
	T120SS Colt truck investment	IDR	~115,000,000
	Working capital for raw material provision	IDR	~555,000,000
	Warehouse equipment requirements	IDR	~26,000,000
	Total capital needed	IDR	~645,000,000

Table 1 summarizes the main assumptions used in the profit and loss simulation, including production volume, raw material requirements, service rates, conversion rates, and buyer demand projections. To ensure consistent operations and provide a common reference for all stakeholders, a business process was formulated through benchmarking, analysis, and internal team discussions, resulting in Standard Operating Procedures (SOPs) that are both aligned with best practices and practical for field implementation (Anderson et al., 2023). The study found that the material center's operations focus primarily on warehouse management, covering material receipt, storage of raw materials and finished products, and goods issuance to SMEs and buyers. Beyond these basic functions, the center also offers value-added services such as product customization, packaging and labeling, kitting, simple assembly, and quality assurance. While basic warehousing can be implemented quickly in the early stages, the long-term success and sustainability of the material center depend on the manager's ability to optimize these value-added services, which are central to meeting buyer, SME, and supplier needs and enhancing competitiveness.

Designing the Material Center Operational Model

The processing and analysis of the material center business model data was carried out to obtain an overview of financial performance as a basis for evaluating the feasibility and sustainability of the business. This analysis was compiled based on the results of processing revenue and operational cost data that had been formulated in the previous business model, using assumptions adjusted to the initial operational conditions of the material center (Böckin et al., 2022). The financial performance simulation focuses on one of the main products, namely hoes, as a representation of metal SME products that have relatively stable production volumes and sustainable market demand. The results of the data processing provide an overview of the material center's financial performance during the two years of operation, as shown in Tables 2 and 3.

Table 2. Income Statement & Material Center Revenue

Description	Unit	Year 1	Year 2
Income Statement	1,000 IDR/Year		
Total Sales	1,000 IDR/Year	4,536,375	5,768,194
Operating Expenses	1,000 IDR/Year	4,126,084	5,238,538
Operating Income	1,000 IDR/Year	410,291	529,656
General & Administrative Expenses	1,000 IDR/Year	180,000	213,840
EBITDA	1,000 IDR/Year	230,291	315,816
Depreciation	1,000 IDR/Year	71,367	71,367
EBIT	1,000 IDR/Year	158,924	244,449
Profit Sharing Expenses	1,000 IDR/Year	79,462	122,225
EBT	1,000 IDR/Year	79,462	122,225
Corporate Tax (25%)	1,000 IDR/Year	19,866	30,556
Net Profit	1,000 IDR/Year	59,597	91,669
Material Center Revenue	1,000 IDR/Year		
Revenue Mgt. Fee PPIC IKM Buyer	1,000 IDR/Year	171,000	225,720
Logistics Service Revenue	1,000 IDR/Year	90,000	118,800
QC & Packaging Service Revenue	1,000 IDR/Year	108,000	142,560

Description	Unit	Year 1	Year 2
Raw Material Sales Revenue	1,000 IDR/Year	4,135,875	5,239,534
Waste Sales	1,000 IDR/Year	31,500	41,580
Grand Total Revenue	1,000 IDR/Year	4,536,375	5,768,194

Table 3. Material Center Costs & Financial Performance

Description	Unit	Year 1	Year 2
Material Center Costs	1,000 IDR/Year		
Operational Costs	1,000 IDR/Year	188,848	236,593
Raw Material Purchase Costs	1,000 IDR/Year	3,973,200	5,042,821
General & Administrative Expenses	1,000 IDR/Year	208,800	245,520
Depreciation	1,000 IDR/Year	71,366	245,520
Grand Total Costs	1,000 IDR/Year	4,442,215	5,770,454
Financial Performance	%/Year or Years		
Return on Assets (ROA)	%/Year	10.4%	18.2%
Return on Equity (ROE)	%/Year	18.5%	28.4%
Break-Even Point (BEP)	Year	5	5

The simulation results show that the financial performance of the material center is positive, with a return on equity of 18% in the first year and a return on assets increasing to 28.4% in the second year. However, these achievements are still heavily influenced by the contribution of revenue from the trading of metal raw materials, which takes a sales margin (Meirizal et al., 2023). Therefore, a further analysis was conducted to assess the possibility of the material center continuing to make a profit without running a raw material trading business, considering that as of October 2019, there were no supplier or distributor partners with whom a permanent cooperation agreement had been established. The simulation was then developed into two scenarios, namely the material center managing the raw material business and the material center operating without taking raw material margins, in an effort to anticipate the uncertainty of how product prices and ensure the sustainability of operational support for SMEs.

Table 4. Comparing Financial Performance: Raw Material Trading vs. Logistics & Warehousing

Material Center Revenue / Cost	Grand Total	Breakdown (%)	Notes
Revenue Material Center	4,536,375 – 5,768,194		"Revenue is still dominated by raw material sales."
Revenue Management Fee PPIC IKM to Buyer		1%	
Logistics Service Revenue		2%	
QC & Packaging Service Revenue		3%	
Raw Material Sales		91%	
Waste Sales		4%	
Cost Material Center	4,377,451 – 5,523,744		"...however, raw material sales also contribute a large cost burden for the material center."
Operating Cost		88%	
Raw Material Purchase Cost		4%	
General & Administrative Cost (G&A)		4%	
Depreciation		4%	
Revenue Material Center (2 years later)	400,500 – 528,660		"By agreeing on service prices with each stakeholder, revenue was very thin in the first 2 years."
Revenue Management Fee PPIC IKM to Buyer		41%	
Logistics Service Revenue		23%	
QC & Packaging Service Revenue		28%	
Waste Sales		8%	

Material Center Revenue / Cost	Grand Total	Breakdown (%)	Notes
Cost Material Center (2 years later)	404,251 – 480,924		"...and profits must be obtained by increasing operational effectiveness and efficiency."
Operating Cost		43%	
General & Administrative Cost (G&A)		41%	
Depreciation		16%	

From Table 4, it can be concluded that the material center can still operate with a negative but minimum margin (nearly break-even) by running a logistics, packaging, warehouse management, and waste sales service business. Based on these calculations, the material center manager is required to make a larger investment in the first year and only reap the results in the second year. Meanwhile, when viewed from the financial and operational impact on SMEs, an analysis was carried out as shown in Table 4 below.

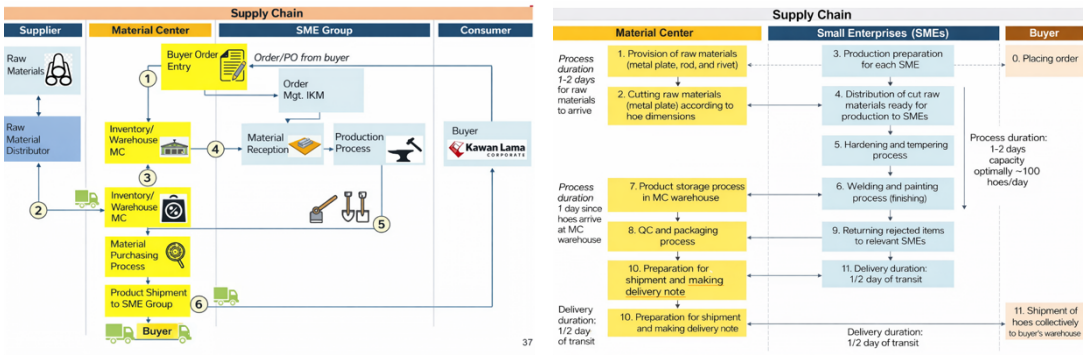
Table 5. Financial Impact on SMEs with Facilitation from the Material Center

Parameter	Unit	Year 1	Year 2
IKM with production scale ~3,000 pieces/month			
Buyer Orders	Pieces/Year	21,600	25,920
Collector Orders	Pieces/Year	18,000	19,800
Revenue from Buyer	IDR/Year	1,080,000	1,425,600
Revenue from the Collector	IDR/Year	810,000	980,100
Costs	IDR/Year	(913,950)	(1,139,970)
Total Production Cost Buyer Orders	IDR/Year		
Total Production Cost Collector Orders	IDR/Year	(734,513)	(888,760)
Profit			
Total Profit from Buyer Orders	IDR/Year	166,050	285,625
Total Profit from Collector Orders	IDR/Year	75,486	91,340
Profit per Buyer Order	IDR/Piece	7,688	11,020
Profit per Collector Order	IDR/Piece	4,194	4,613
Parameter	Unit	Year 1	Year 2
IKM with production scale ~1,000 pieces/month			
Buyer Orders	Pieces/Year	7,200	8,640
Collector Orders	Pieces/Year	6,000	6,600
Revenue from Buyer	IDR/Year	360,000	475,200
Revenue from the Collector	IDR/Year	270,000	326,700
Costs	IDR/Year	(304,650)	(379,992)
Total Production Cost Buyer Orders	IDR/Year		
Total Production Cost Collector Orders	IDR/Year	(244,838)	(296,253)
Profit			
Total Profit from Buyer Orders	IDR/Year	55,350	95,208
Total Profit from Collector Orders	IDR/Year	25,163	30,447
Profit per Buyer Order	IDR/Piece	7,688	11,020
Profit per Collector Order	IDR/Piece	4,194	4,613

Note: With a net price of Rp 50,000 per shovel, the SME can obtain a gross profit of approximately IDR 7,500 per shovel. Buyers may offer IDR 53,000–55,000 per piece; after 10% VAT deduction, farmers still get a gross profit of IDR 6,000 per shovel.

Based on Table 5, logistics, packaging, and warehousing costs have been consolidated under the Material Center, generating savings through economies of scale as these activities are coordinated collectively. With a net price of IDR 50,000 per hoe, IKM can earn a gross profit of ~IDR 7,500, and if buyers offer IDR 53–56 thousand, farmers can still earn ~IDR 6,000 per hoe after 10% VAT, which is higher than previous profits. Operational benefits for IKM include cheaper, continuous, and standardized raw material procurement through minimum quantity discounts, optimized packaging and transportation via collective QC, packaging, and shipping, and reduced SME workload

as PPIC and administrative tasks are handled by the material center, enabling SMEs to focus on order timeliness and production quantity.



(a) (b)

Figure 5. (a) Process Mapping from the Ordering of Goods by the Buyer to the Delivery of Products to the Buyer; and (b) Mapping of the Production Process Duration from Raw Material Ordering to Delivery

After conducting in-depth analysis and benchmarking, the proposed business process for the Mekarmaju Village SME Material Center is shown in Figure 5a. In terms of processing time, the estimated time required from the moment the buyer's order is received until the goods are shipped is approximately 3-4 days. This time estimate is based on the analysis of a team of experts, taking into account the operational conditions of the Material Center. A relatively larger amount of time is allocated to the procurement and delivery of raw materials, given that orders are placed in aggregate for all Material Center partner SMEs.

Based on Figure 5b, the material center warehouse operations are supported by 7 SOPs and 12 daily operational forms across three main areas. Inbound Warehouse Management includes SOPs for receiving and counting goods, supported by arrival forms, labels, and Quality Control (QC) documentation. Outbound Warehouse Management covers SOPs for delivery scheduling and goods issuance, along with waybills, outgoing labels, and issuance forms. Logistics operations include SOPs for raw material procurement, Purchase Order (PO) progress monitoring, and QC and packaging per buyer standards, supported by stock records, delivery schedules, raw material orders, and PO progress data collected by SMEs.

To effectively carry out its functions, the Material Center requires an organizational structure capable of coordinating roles and responsibilities efficiently. Stakeholder involvement is crucial to ensure management sustainability and accountability (Yasah et al., 2024). Key stakeholders include the village government as local policy maker and facilitator, Ministry of Industry advisors providing technical guidance and capacity building, and Material Center managers responsible for daily operations and SME services (Iskandar et al., 2021). The organizational structure consists of five strategic positions requiring 7–8 personnel: a Head of Management overseeing the entire business chain (minimum D1 education and negotiation skills); Administration and Finance handling fund recording and billing; Procurement ensuring SME raw material needs; Warehouse and Logistics Management, responsible for goods flow and stock, which can be combined with Procurement; and 3–4 Warehouse Operators (minimum elementary education) handling warehousing, material types, and transportation for distribution.

Focus Group Discussion and Follow-Up Plan for Material Center Development

To ensure the readiness and sustainability of the Mekarmaju Village Metal IKM Material Center, a joint forum was needed to align stakeholder understanding, interests, and commitments. An FGD was therefore conducted as a strategic forum to discuss initial operational preparations, validate assumptions about the business and operational models, and formulate collaborative steps among stakeholders (Tantra et al., 2024; Deni & Ruswandi, 2025). The FGD, entitled "Preparation for the Launching and Cooperation

of the Mekarmaju Village Metal IKM Material Center," was held on Tuesday, October 1, 2019, at the Sutan Raja Hotel, Soreang, Bandung Regency, featuring five main speakers representing government, academia, business, and associations: experts from the Ministry of Industry's Material Center, Dr. E. A. K., representatives from PT Kawan Lama Sejahtera, the Bandung Regency Office, and the Indonesian Farmers Association (HKTI).

The FGD results show strong support for the Material Center concept as a supply chain aggregator that can improve the efficiency of raw material procurement, warehouse management, quality control, and IKM product logistics (Hossain, 2023). From a technical perspective, the importance of material standardization and consistency of supply sources was emphasized to ensure product quality in accordance with SNI standards. From a market perspective, potential buyers expressed satisfaction with the prototype SME products and opened up opportunities for further cooperation, provided that there is consistency in quality, product specifications, and quality control and delivery mechanisms. The local government expressed its support for institutional development and strengthening, although it noted challenges related to the legality of BUMDES in establishing formal business cooperation, suggesting the formation of a subsidiary legal entity as a medium-term solution.

As a follow-up, the FGD produced a number of concrete action plans that must be implemented immediately to support the launch and initial operations of the Material Center. These plans include finalizing price negotiations and product cooperation, preparing warehouses and supporting infrastructure, preparing human resources for management, and intensive coordination with buyers and distributors of raw materials. To bind the joint commitment, it was agreed that the initial cooperation would be outlined in a Memorandum of Understanding (MoU) as an umbrella agreement, which would then be translated into a more technical Cooperation Work Agreement (*Perjanjian Kerja Sama*/PKS). This series of agreements became the initial foundation for the operation of the material center and the strengthening of the Mekarmaju Village metal SME ecosystem in a sustainable manner. To support the cooperation framework, the team proposed drafting an MoU between the parties, with the general content of the MoU draft presented in the sequential Figure 6.

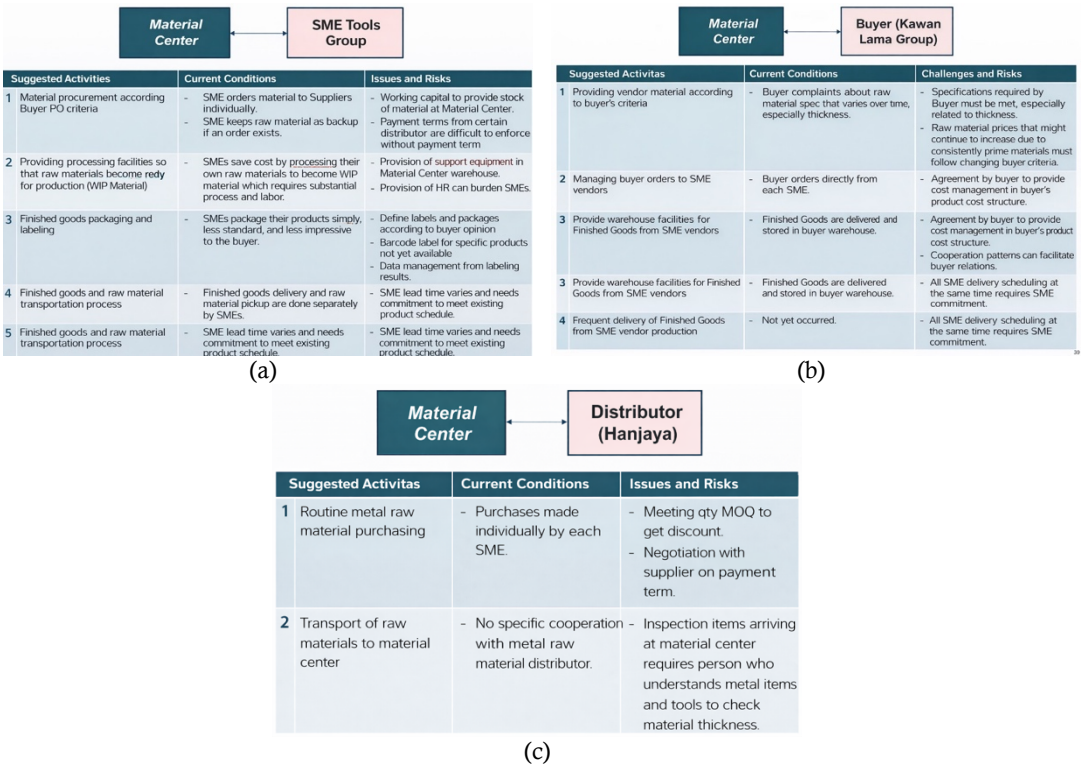


Figure 6. Cooperation Points between the Material Center and (a) IKM; (b) Buyer; and (c) Metal Distributors

Figure 6 illustrates the MoU concept, which serves as a foundation for approaching the operational phase with detailed technical scopes of cooperation. For instance, in logistics management between the material center and IKM, the center is expected to coordinate with IKM on logistics costs per item, delivery schedules, procedures for receiving goods, and order verification, in line with agreed terms.

To ensure sustainability and address operational challenges at the material center in Mekarmaju Village in 2020, two key initiatives are planned: providing warehouse infrastructure support and intensive mentoring for human resources, including coaching the IKM agricultural tool supply chain. Support from the Ministry of Industry is crucial for three main activities. Distribution of raw materials (initial stock, order recording, distribution), product delivery (warehouse recording, consumer delivery, transaction monitoring), and SME performance evaluation (ranking based on product standards and payment commitments). By integrating infrastructure, strengthening HR competencies through SOPs, and regularly monitoring production quality and quantity, the Material Center is expected to consistently meet buyer expectations professionally (Ahmad et al., 2025).

DISCUSSION

The study's findings have important implications for the financial performance of metal SMEs in Mekarmaju Village. The material center serves as a strategic intervention addressing key supply chain bottlenecks, impacting cost efficiency, revenue, working capital, and long-term sustainability. By aggregating procurement, SMEs gain economies of scale previously unavailable to individual producers. FGD results show raw materials account for 60–70% of total production costs; consolidating orders through the center can reduce these costs by 10–15%, directly improving gross margins without raising prices. Centralized logistics and warehousing further lower overheads. Previously, each SME covered separate transportation costs for materials and finished goods. Shared infrastructure spreads these costs across multiple producers, reducing per-unit expenses, consistent with Yudhawati et al. (2024) findings on cost efficiencies in metal IKM clusters.

The material center facilitates access to large buyers, such as Kawan Lama Group, which individual SMEs cannot reach alone. By providing quality control and coordinated delivery, SMEs can meet strict requirements for consistent quality, timely delivery, and standardized specifications, enabling entry into premium market segments. FGD results highlight the implementation of SNI-compliant standards, allowing products to command 15–20% higher prices than non-standard alternatives. This quality assurance directly enhances revenue, aligning with Fadillah and Sofwan (2025), who found that SME clusters with standardized systems achieved higher sales prices and better customer retention.

The material center significantly improves working capital management. Before centralization, SMEs maintained excessive inventory due to irregular raw material availability, tying up limited capital. The center's systematic inventory management ensures consistent supply, allowing leaner inventories and lower working capital needs. Findings also show that price volatility and supply uncertainty previously disrupted cash flow. Aggregated purchasing and strong supplier relationships stabilize prices and supply schedules. Additionally, the center's credit facilitation through direct financing or supplier guarantees further eases working capital constraints, supporting Fadli et al. (2023) on the role of business model innovation in improving SME financial access.

Beyond immediate cost and revenue benefits, the material center enhances long-term financial sustainability for SMEs. Formalized agreements through MoUs and PKSs provide predictable planning and support investment in production capacity and technology upgrades. A ranking system based on product standards and payment commitments incentivizes high performance, granting preferential orders and better pricing, which reinforces financial discipline and cluster-wide health. The center also improves access to formal financing. Its transaction records and documentation help SMEs demonstrate creditworthiness for loans, while collective arrangements may enable

group lending or supply chain financing otherwise unavailable to individual producers. The material center reduces financial risks for SMEs, which previously faced raw material price fluctuations, demand variability, and buyer payment defaults. The centralized model distributes these risks across participants, while standardized payment terms with buyers and suppliers lower cash flow uncertainty and share inventory risk.

Government involvement, particularly from the Ministry of Industry, adds credibility and enhances negotiation power with large buyers and suppliers, securing more favorable terms. This institutional support, as noted by Iskandar et al. (2021) in BUMDES development studies, helps bridge the trust gap that often limits SME participation in formal supply chains. Despite the substantial financial potential, several challenges may limit or delay benefits. FGD discussions highlighted BUMDES's legality constraints, which may restrict the material center from entering formal commercial agreements until proper legal structures are in place. Financial success also depends on sufficient SME participation to achieve economies of scale, requiring commitment to channel transactions through the center rather than reverting to individual arrangements. Additionally, operational costs, including warehouse infrastructure, management, quality control, and administration, must be covered. Sustainable fee structures and transparent cost allocation are essential to maintain net financial benefits for participating SMEs.

CONCLUSION

The establishment of a material center with an integrated business model is a strategic solution in promoting the strengthening and development of metal SMEs in Bandung Regency, particularly in Mekarmaju Village. Improvements in the supply chain through the aggregate management of raw material procurement, logistics, and warehousing, as well as the implementation of quality control and coordinated packaging standards, have been proven to increase operational efficiency, monitoring transparency, and product quality consistency in line with buyer standards and expectations. This model can strengthen the competitiveness of SMEs in meeting market needs and create economies of scale that provide added value for all stakeholders.

However, the success of the material center implementation is highly dependent on operational readiness, commitment to cooperation among stakeholders, and continuous assistance from the government. The role of the Ministry of Industry in bridging business cooperation, supervising raw material quality, expanding market access, and supporting the improvement of IKM technical capacity is a key factor in maintaining the operational sustainability of the material center. Through this collaborative approach, the material center has the potential to become a replicable, sustainable model for the development of metal IKM that can strengthen the village-based industrial structure at the regional and national levels. However, the success of the model is limited by factors such as legal constraints, SME participation commitment, and operational cost sustainability. Future research could examine the replicability of this model in other villages or sectors, as well as quantitatively assess its long-term financial and operational impacts.

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