

A MODEL FOR DEVELOPING SMALL-SCALE METAL CASTING INDUSTRIES FOR ENHANCING COMPETITIVENESS (CASE STUDY IN CEPER, KLATEN, INDONESIA)

Tri Hidayatno 1 , Abdul Aziz Sanapiah 1 , Muhammad Taufiq 1 , R.N Afsdy Saksono 1

1 National Institute of Public Administration School of Administration (Poltek STIA LAN) Jakarta

Contact details for the corresponding author: Tri Hidayatno, National Institute of Public Administration (NIPA) School of Administration (Poltek STIA LAN) Jakarta, Jl. Raya Condet No. 17, Jakarta Timur 13810, Indonesia,

Abstract

This study aims to analyze the factors underlying the suboptimal performance of the development program for small-scale metal casting industries in Ceper, Klaten, and to formulate an implementable model for its effective enhancement. The research employs a descriptive qualitative approach through in-depth interviews, framed by the collaborative governance perspective of Ansell and Gash.

The findings reveal four fundamental dimensions that constitute the root causes. **First**, initial conditions are characterized by the absence of policy prioritization, weak data and monitoring systems, fragmented and volatile raw material supply chains, limited technological capacity and adoption, and constraints in human resources and access to capital. **Second**, institutional design is inadequate, as reflected in the absence of a formal and inclusive collaborative forum and the lack of a comprehensive industrial roadmap. **Third**, facilitative leadership remains ineffective due to the absence of a neutral facilitator and the reliance on individual figures rather than system-based leadership. **Fourth**, the collaborative process has not yet developed adequately, indicated by weak dialogue, limited trust, and insufficient shared commitment among stakeholders

Based on these analyses and findings, the study proposes the **Sustainable Multi-Stakeholder Consensus Collaborative Governance Model**, which adapts the Ansell and Gash framework to establish a participatory, systematic, and sustainable development ecosystem. The model consists of three principal elements: (a) input factors affecting the effectiveness of collaborative processes, including initial conditions, institutional design, and facilitative leadership; (b) core collaborative processes comprising six components—regular face-to-face interaction, trust building, commitment to the process, shared understanding, production of intermediate outcomes, and consensus; and (c) output factors encompassing results and feedback components. The proposed model offers an actionable governance solution for enhancing SME resilience and competitiveness in developing country contexts.

Keywords: Small-Scale Industry, Metal Casting, Triple Helix, Sustainable Multi Stakeholder Consensus Collaborative Governance Model, Technology Adoption.

Introduction

Industrialization is widely recognized as a crucial driver of regional economic growth and structural transformation, particularly in developing countries. Manufacturing activities generate value added, stimulate productivity growth, and facilitate labor absorption, thereby strengthening regional economic resilience (Tambunan, 2011). In Indonesia, the manufacturing sector has increasingly balanced the historical dominance of agriculture and emerged as a key contributor to

national and regional economic performance (Kementerian Perindustrian, 2019). Empirical studies consistently demonstrate that manufacturing industries play a central role in employment creation, technological upgrading, and regional competitiveness, especially when supported by localized industrial clusters (Tambunan, 2009; Mariyudi, 2019).

At the regional level, Kabupaten Klaten exemplifies this pattern, where manufacturing consistently accounts for the largest share of regional gross domestic product. Small-scale industries represent a critical component of this sector due to their labor-intensive characteristics and strong linkages with local livelihoods. As part of the broader micro, small, and medium enterprise (MSME) ecosystem, small industries in Indonesia have shown notable resilience during economic downturns and crises, contributing significantly to income stabilization and unemployment reduction (Sudaryanto et al., 2012; Emiliani et al., 2021). Previous research highlights that MSMEs play a strategic role not only in economic growth but also in maintaining social stability during periods of macroeconomic uncertainty (Tambunan, 2011; Darwanto & Danuar, 2013; Wahyuningrum Putri & Anggraini, 2014).

These challenges are particularly evident in traditional manufacturing clusters, such as the small-scale metal casting industry in Ceper, Klaten. While this cluster historically contributed substantially to local economic growth, successive economic shocks including the Asian financial crisis, the global financial crisis, and the COVID-19 pandemic have exposed structural vulnerabilities related to raw material dependence, technological stagnation, weak institutional organization, and limited integration into broader supply chains. Small and medium enterprises are disproportionately affected by economic crises due to their limited financial buffers, technological capabilities, and organizational flexibility (Juergensen et al., 2020; Tsai & Chou, 2019). During the COVID-19 pandemic, global supply chain disruptions further reduced production capacity and market access for manufacturing SMEs, intensifying competitive pressures from imported products (Adam & Alarifi, 2021; Abdalla, 2021).

Recent studies emphasize that innovation capability, digital maturity, and organizational learning are critical determinants of SME resilience under crisis conditions. Firms that adopt innovation practices, digital ecosystems, and competitive intelligence strategies demonstrate higher adaptive capacity and survival rates during external shocks (Adam & Alarifi, 2021; Ardolino et al., 2022; Yudianto et al., 2024). Furthermore, integrated sustainability-oriented frameworks that balance economic, social, and environmental objectives have been shown to enhance long-term performance and competitiveness of manufacturing SMEs (Tsai & Chou, 2019; Saleh et al., 2025). Knowledge management, organizational structure, and technological adoption are increasingly recognized as interconnected drivers of sustainable manufacturing performance and resilience (Fortier & Gamache, 2025).

Building on these insights, this study aims to develop an integrated development model for small-scale metal casting industries based on an in-depth case study of the Ceper cluster in Klaten, Indonesia. By combining sustainability principles, competitive capability enhancement, and technological adoption, the proposed model seeks to overcome fragmented development approaches and offer a context-specific yet transferable framework for strengthening the resilience and competitiveness of small-scale manufacturing industries in developing economies.

This study contributes to the collaborative governance literature by proposing a Sustainable Multi-Stakeholder Consensus Collaborative Governance Model that extends existing models by explicitly incorporating (1) data governance integration, (2) long-term industrial sustainability orientation, and (3) localized consensus mechanisms among government, industry, and academia actors within SME industrial clusters. Unlike prior collaborative governance frameworks that emphasize process dynamics and stakeholder engagement, this model highlights the institutional role of shared data, sustainability alignment, and continuous consensus-building as critical determinants of policy effectiveness in traditional industrial clusters.

Literature Review

Small and Medium Enterprises (SMEs), particularly small-scale metal industries, play a strategic role in economic development, employment creation, and industrial value chains, especially in developing countries (Berry, 2007; Warner, 2001). In Indonesia, SMEs absorb more than 97% of the labor force and contribute over 60% to national GDP, yet they continue to face structural challenges related to limited access to capital, low technological adoption, weak managerial capacity, and restricted integration into global supply chains (Suci et al., 2017; Solikhin, 2019). Prior studies emphasize that small metal industries, despite their economic significance, often operate with manual production systems, limited product diversification, and underdeveloped marketing strategies, which hinder productivity and competitiveness (Tambunan, 2006; Erdin & Ozkaya, 2020).

Government intervention has been widely recognized as a critical driver for SME empowerment through regulatory frameworks, financial access, and partnership facilitation. In Indonesia, SME-oriented policies have evolved progressively from Law No. 9/1995 to Law No. 20/2008 and further strengthened through the Job Creation Law and Government Regulation No. 7/2021, emphasizing financing, partnership models, and supply chain integration. However, empirical studies indicate that policy implementation remains uneven, with many empowerment programs characterized by top-down approaches and limited local stakeholder engagement (Herawati, 2011; Septa Rinawati & Sadewo, 2019). Consequently, the effectiveness of government-led initiatives depends not only on regulatory support but also on collaborative mechanisms that align policy objectives with local industrial realities.

Comparative studies reveal that SMEs in developed economies benefit from strong institutional support, digital integration, and access to global markets, while SMEs in developing countries such as Indonesia, India, and Brazil face persistent constraints in infrastructure, technology, and financing (Firdausya & Ompusunggu, 2023; Simangunsong, 2022). Digital transformation has been identified as a key enabler for improving SME competitiveness, particularly through enhanced market access, efficiency, and innovation capacity (Slamet et al., 2017; Putra, 2021). Nevertheless, low digital literacy and resistance to change among SME actors remain major barriers to successful digital adoption (Kholidah & Hakim, 2018).

Partnership-based empowerment models have gained increasing attention as an alternative approach to conventional government programs. Several studies highlight the role of corporate social responsibility (CSR), large-firm partnerships, and cluster-based collaboration in strengthening SME production capacity and market access (A'yun & Fitriyah, 2019; Vicario & Nawangpalupi, 2020). While these models demonstrate positive outcomes, their sustainability is often questioned due to dependency on large firms and limited capability transfer to SMEs (Widyani, 2013). This indicates the need for more inclusive and balanced partnership frameworks that ensure long-term capacity building rather than short-term assistance.

Stakeholder theory provides a relevant analytical lens for understanding SME empowerment through multi-actor collaboration. Effective empowerment requires alignment among government, SMEs, private sector actors, academics, and local communities, each possessing distinct interests, power, and resources (Freeman, 1984; Bryson, 2004). Empirical studies emphasize that trust, commitment, and shared understanding among stakeholders are decisive factors influencing collaboration outcomes (Mitchell et al., 1997; Harrison & Freeman, 1999). Without effective stakeholder management, empowerment initiatives risk fragmentation, coordination failure, and limited impact.

In response to these challenges, the collaborative governance framework offers a comprehensive approach to SME empowerment by integrating multi-stakeholder participation, consensus-oriented decision-making, and institutionalized collaboration (Ansell & Gash, 2008;

Emerson et al., 2012). Prior research suggests that collaborative governance can enhance SME competitiveness by fostering trust, facilitating knowledge transfer, and aligning policy implementation with local needs (Irawan, 2017; Muhyi & Chan, 2017). However, empirical evidence also highlights persistent obstacles, including power imbalances, weak facilitative leadership, and insufficient institutional design, which limit the effectiveness of collaborative governance in SME development contexts.

Research Method

The research method employed in this study is a qualitative approach with case study aimed at achieving a comprehensive understanding of the implementation of collaborative governance in the development of small-scale metal casting industries in Ceper, Klaten, Indonesia. The Ceper metal casting cluster provides an appropriate empirical context in which the complexity of industrial development policies, multi-actor collaboration, and institutional coordination can be effectively captured. These dynamics involve interactions among government agencies, industry associations, small-scale enterprises, and academic institutions operating at local and national levels. A descriptive qualitative approach enables the researcher to identify, examine, and explain the processes through which collaborative governance is designed, implemented, and constrained, particularly in relation to strengthening the competitiveness of small-scale metal industries.

Sources and Types of Data

This study utilizes primary and secondary data sources. Primary data consist of field observations and in-depth interviews with key stakeholders involved in the collaborative governance process, including representatives from central and local government institutions, industry associations, small-scale metal casting entrepreneurs, and academic institutions. These data capture firsthand perspectives on policy implementation, actor participation, coordination mechanisms, and perceived challenges within the development program.

Secondary data include official policy documents, industrial development reports, statistical publications, and regulatory frameworks issued by institutions such as the Ministry of Industry, the Central Bureau of Statistics, and local government agencies. In addition, relevant academic journals, research reports, and previous studies on SME development and collaborative governance were reviewed to provide analytical context and theoretical grounding.

Data Collection Techniques

Data were collected through qualitative observation, semi-structured interviews, document analysis, and literature review. Observations were conducted within the Ceper metal casting cluster to examine production activities, interaction patterns among actors, and the practical implementation of development programs. Semi-structured interviews were employed to allow informants to express their experiences, interpretations, and assessments of collaborative practices while ensuring comparability across respondents.

Document analysis and literature review were used to obtain a comprehensive understanding of policy objectives, institutional arrangements, and program outcomes related to the development of small-scale metal casting industries. These techniques enabled the researcher to contextualize empirical findings within broader policy and governance discourses.

Data Analysis Techniques

The collected data were analyzed using qualitative content analysis and thematic coding within a descriptive-analytical framework. Primary and secondary data were initially subjected to open coding to identify key themes related to actor roles, collaboration mechanisms, institutional support, and barriers to effective governance. Subsequently, axial coding was applied to examine relationships among themes, particularly the interaction between government facilitation, industry participation, and academic support within a Triple Helix-based collaborative governance model. Finally, selective coding was conducted to refine the analysis and focus on patterns that explain

the effectiveness and limitations of collaborative governance in enhancing the competitiveness of small-scale metal casting industries.

To ensure validity and reliability, source triangulation was applied by systematically comparing interview findings, observational data, policy documents, and existing literature. This analytical process produced a holistic understanding of collaborative governance dynamics and provided empirically grounded insights into the challenges and opportunities for strengthening SME development programs in the Ceper metal casting cluster.

Results

The Industrial Reality of Ceper's Metal Casting Cluster

Ceper District in Klaten Regency has long been recognized as one of Indonesia's prominent metal casting centers, with its development dating back to the colonial period. For decades, this industrial cluster has played an important role in supporting the local economy, primarily through the activities of small and medium-sized enterprises. Nevertheless, recent conditions indicate a decline in productivity as well as challenges in maintaining operational sustainability. Many small-scale foundries tend to operate only when incoming orders are sufficient to utilize the full capacity of their traditional cupola furnaces, which are associated with high operating costs and inefficiencies when used for small-scale production.

This situation reflects a critical operational constraint rooted in the continued reliance on conventional cupola furnaces. Although these furnaces have historically been the backbone of metal casting production in the area, their economic viability depends on large-volume melting processes. As a result, they have become increasingly unsuitable for meeting current demands for flexible and adaptive production systems.

Figure 1 shows a traditional cupola furnace typically used in Ceper's small-scale foundries.



The COVID-19 pandemic further worsened existing challenges by disrupting supply chains and sharply reducing demand, while government support for small-scale metal casting remained limited due to shifting policy priorities. Although metal casting continues to represent Ceper's industrial identity, the sector shows clear signs of stagnation, characterized by low innovation and limited involvement of younger generations. Moreover, 2019 data indicate that small-scale foundries are concentrated in only a few villages, particularly Ngawonggo and Tegalrejo.

Table 1. Distribution of Metal Casting Industries by Village in Ceper District (2019)

No	Village	Large-Scale Industry	Medium-Scale Industry	Small-Scale Industry
1	Ceper	–	10	23
2	Cetan	–	–	–
3	Dlimas	2	1	2
4	Jambu Kidul	–	–	3
5	Jambu Kulon	2	–	2
6	Jombor	–	–	–
7	Kajen	–	–	–
8	Klepu	4	25	–
9	Kujon	–	1	–
10	Kuncen	–	–	1
11	Kurung	1	1	1
12	Meger	–	–	2
13	Mlese	–	–	1
14	Ngawonggo	–	13	55
15	Pasungan	–	–	–
16	Pokak	–	–	–
17	Srebegan	–	–	–
18	Tegalrejo	2	17	54
	Total	11	58	144

Source: Department of Industry and Manpower, Klaten Regency

Fragmented Governance and Lack of Policy Alignment

Development efforts in Ceper's metal casting cluster are constrained by weak coordination between national and regional policies. Both RIPIN 2015-2035 and RPIK 2021-2041 acknowledge Ceper only marginally, without clear prioritization, funding allocation, or executable programs. As a result, development initiatives lack coherence, produce limited impact, and fail to provide sustained support for small-scale producers.

Data Gaps and Monitoring Limitations

Development efforts in Ceper's metal casting cluster are constrained by weak coordination between national and regional policies. Both RIPIN 2015-2035 and RPIK 2021-2041 acknowledge Ceper only marginally, without clear prioritization, funding allocation, or executable programs. As a result, development initiatives lack coherence, produce limited impact, and fail to provide sustained support for small-scale producers.

Raw Material Volatility and Supply Chain Fragility

Ceper's foundries depend heavily on informally sourced scrap metal, resulting in unstable prices and inconsistent material quality. The lack of centralized sorting, certification, and testing systems undermines product reliability and reduces buyer confidence. These structural weaknesses are further intensified by competition from imported metal products, which erodes the competitiveness of local producers.

Limited Technology Adoption and Innovation Gaps

Despite the availability of modern facilities, including induction furnaces and testing laboratories at Polman Ceper, the actual level of technology utilization remains low. Adoption among small-scale foundries is constrained by limited technical capacity and high fixed operational costs, particularly electricity-related expenses. Consequently, technologies with the potential to improve efficiency, production flexibility, and environmental performance have not been widely integrated into daily operations.

In addition, technological support programs tend to be ceremonial or donor-driven, with insufficient emphasis on sustained adoption and skills development. Most small-scale foundries in Ceper continue to rely on traditional sand casting techniques that are highly manual and labor-intensive. While this method remains financially accessible, it restricts production consistency and scalability, thereby reinforcing long-standing dependence on inherited artisanal practices rather than encouraging technological upgrading..

Figure 2 presents a typical manual casting process using sand molds, exemplifying the conventional approach still prevalent in most small-scale operations.



Human Capital Challenges and Regeneration Crisis

The Ceper metal casting industry faces a critical human capital challenge marked by an aging workforce and low levels of formal education. Most workers come from older generations with limited exposure to modern industrial practices, while younger individuals are increasingly reluctant to enter the sector due to relatively low wages, physically demanding working conditions, and the declining social attractiveness of metal casting occupations.

This workforce profile constrains the industry's capacity for upgrading and innovation. Limited educational attainment reduces the ability of workers to adopt new technologies, operate modern machinery, and benefit effectively from technical training initiatives, thereby reinforcing structural stagnation and weakening the long-term sustainability of the cluster.

Resources of Funding and Market Access

Limited access to financing remains a critical barrier to modernization and capacity upgrading among small-scale metal casting industries. Available credit schemes, particularly Kredit Usaha Rakyat (KUR), are predominantly used for short-term working capital rather than long-term investment in machinery or technology. As a result, financing mechanisms intended to support industrial upgrading tend to sustain traditional production practices instead of enabling structural transformation.

These constraints are reinforced by weak incentive structures and strict administrative requirements in formal financing, which exclude many small producers from investment-oriented credit. Consequently, firms often rely on informal arrangements such as subcontracting, which ensure short-term continuity but generate low margins and limit opportunities for reinvestment and innovation. This condition aligns with Financial Constraints Theory, which explains how information asymmetries and collateral requirements restrict small firms' access to capital expenditure financing (Beck et al., 2005).

Market access limitations further intensify these challenges. Production in Ceper remains largely by-order, leaving small producers with weak bargaining power and limited price-setting capacity. Although some firms have participated in strategic projects, such involvement is typically temporary and does not guarantee sustained demand. Government-led market expansion initiatives, including business matching and digital platforms, have produced limited outcomes, as many activities do not translate into long-term contracts or stable production linkages.

Overall, financing constraints and unstable market access form a reinforcing cycle that traps small-scale foundries in low-capacity equilibrium. This suggests that effective industrial upgrading requires not only improved access to finance, but also investment-oriented credit instruments and more sustainable market integration mechanisms.

Summary of the Five Dimensions of Collaborative Governance

This study demonstrates that the development of the Ceper metal casting cluster reflects all five dimensions of the collaborative governance model proposed by Ansel and Gash, although their implementation remains uneven and fragmented.

Starting conditions are characterized by significant power and resource asymmetries among stakeholders. Small-scale foundries operate with limited capital, low technological capacity, and weak bargaining power, while government agencies and educational institutions possess regulatory authority and technical resources but lack executional leverage. Historical mistrust, weak incentives for collaboration, and the absence of clear economic returns further constrain early collaborative engagement.

In terms of institutional design, formal policy frameworks exist at both national and regional levels; however, they provide limited operational guidance for cluster prioritization, financing mechanisms, and long-term capacity building. The absence of clear mandates, performance indicators, and fiscal incentives has resulted in overlapping programs, short-term interventions, and weak accountability among participating actors.

The collaborative process remains largely consultative rather than integrative. Interaction among government, industry, cooperatives, and educational institutions is episodic and project-based, often driven by external programs such as training, exhibitions, or donor initiatives. Trust-building, shared understanding, and joint decision-making are still limited, as collaboration rarely translates into sustained production partnerships or coordinated investment strategies.

Regarding facilitative leadership, leadership roles are present but fragmented. Local government agencies and Polman Ceper act as facilitators through training, certification, and technical support; however, they lack sufficient authority and resources to align stakeholders toward collective outcomes. The absence of a strong coordinating actor weakens strategic direction and reduces the effectiveness of collaborative efforts.

Finally, outcomes of collaborative governance have been modest and largely incremental. While collaboration has contributed to limited improvements in skills, awareness, and institutional linkages, it has not yet generated structural transformation in technology adoption, financing access, or market integration. The persistence of traditional production systems and subcontracting arrangements indicates that collaborative governance has not fully translated into sustainable competitiveness gains.

Overall, the findings suggest that collaborative governance in the Ceper foundry cluster remains at an early and transitional stage. Strengthening outcomes requires more coherent institutional design, outcome-oriented financing, stronger facilitative leadership, and deeper integration between policy, industry needs, and market mechanisms.

Discussion

The study reveals that Ceper's metal casting cluster faces interrelated structural and institutional barriers. Weak coordination across government levels, outdated industrial data systems, and fragmented supply chains have limited the effectiveness of existing development efforts. As a result, many policy interventions remain short-term, sectoral, and insufficient to address the cluster's systemic challenges.

Using the collaborative governance framework (Ansell & Gash, 2008), the findings indicate that the absence of sustained and structured interaction among government, academia, and industry has led to uncoordinated programs with limited long-term impact. Key supporting institutions, such as Polman Ceper, remain underutilized, while no formal collaborative platform exists to align industrial needs, innovation, and human capital development.

Technology adoption remains low due to limited technical capacity and weak follow-up support. Donated equipment is often underutilized, while small producers lack both capital and skills to modernize production processes. At the same time, the aging and under-educated workforce presents a serious regeneration challenge, as younger generations increasingly avoid the sector due to poor working conditions and low social prestige.

Supply chains are also fragile, relying heavily on informal scrap metal collection without centralized certification, quality control, or price stabilization mechanisms. This condition undermines production efficiency, product consistency, and market trust, further weakening the competitiveness of small-scale foundries.

To address these interconnected challenges, this study proposes a Sustainable Multi-Stakeholder Consensus Collaborative Governance Model as an operational governance solution grounded in empirical findings. As illustrated in Figure 4, the model integrates three key components: (1) input factors comprising initial conditions, institutional design, and facilitative leadership, (2) a core collaborative process centered on dialogue, trust-building, commitment, shared understanding, intermediate outcomes, and actor consensus and (3) output factors consisting of results and feedback mechanisms that ensure continuity and learning.

Facilitative leadership plays a cross-cutting role within the model by coordinating actors, mediating interests, mobilizing resources, and safeguarding the implementation of collective commitments. By placing consensus at the core of the collaborative process, the proposed model addresses institutional fragmentation and creates a structured yet adaptive governance mechanism. Unlike prior studies that primarily describe SME constraints, this research

contributes by offering an empirically grounded and context-sensitive governance model tailored to local industrial clusters within decentralized governance systems.

Figure 3 Sustainable Multi Stakeholder Consensus Collaborative Governance Model for Small-Scale Metal Casting Industry Development in Ceper, Klaten

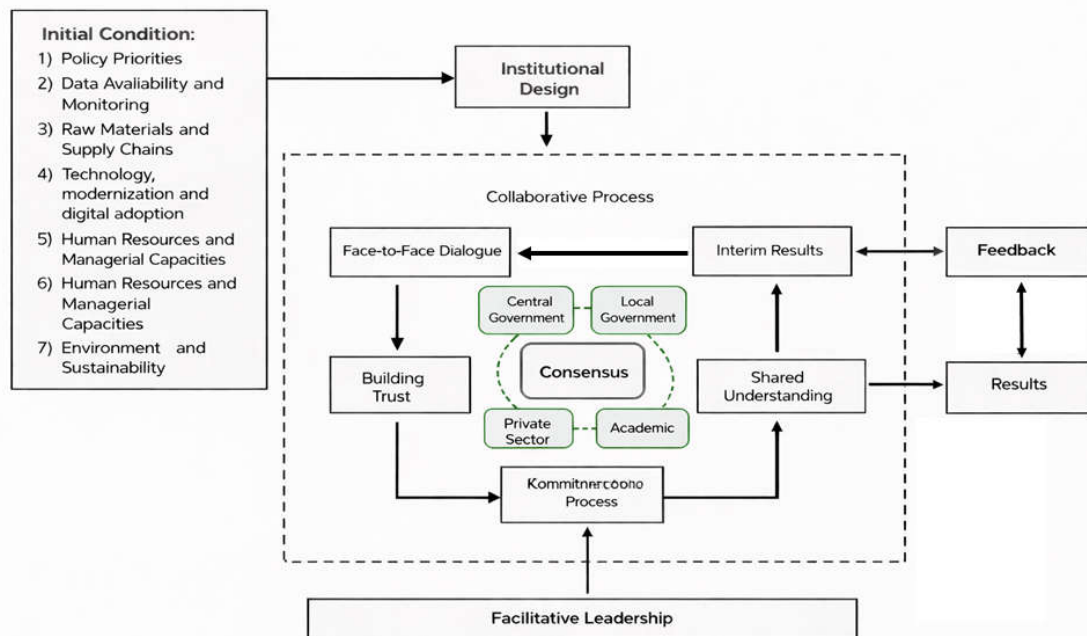


Figure 3 illustrates the proposed Sustainable Multi-Stakeholder Consensus Collaborative Governance Model, developed to strengthen the small-scale metal casting industry in Ceper, Klaten, Indonesia. This model integrates various governance components into a unified framework that enables inclusive participation, iterative learning, and adaptive policy responses. The model is particularly relevant in contexts where industrial clusters face challenges related to institutional fragmentation, limited resources, and unequal power distribution among stakeholders.

The model begins with **Initial Conditions**, which are treated not as fixed prerequisites but as dynamic factors that continuously influence and are influenced by the collaborative process. These initial conditions include policy priorities, data availability and monitoring, raw materials and supply chains, technological modernization and digital adoption, human resources and managerial capacities, and environmental sustainability. While these elements often represent structural constraints, in this model they are reframed as potential drivers for collaboration, especially when addressed through appropriate institutional design. For instance, limited access to skilled labor or digital tools may encourage coordinated responses from multiple stakeholders rather than isolated efforts.

Institutional Design serves as a foundational mechanism that facilitates and structures stakeholder interaction. It determines the rules, incentives, and coordination platforms through which collaboration takes place. In the context of Ceper, this design could involve aligning local industrial development plans with national strategies, formalizing informal networks within the industry, and introducing participatory mechanisms that give voice to smaller actors. Adaptive and context-specific institutional arrangements are crucial to ensure responsiveness to local needs and to mitigate power asymmetries among actors.

The core of the model is the **Collaborative Process**, which unfolds through a series of interactive steps. It begins with **Face-to-Face Dialogue**, which serves to clarify expectations,

build mutual understanding, and reduce mistrust. This dialogue leads to **Trust-Building**, a crucial prerequisite for achieving any form of shared commitment. Once a degree of trust is established, stakeholders are more likely to demonstrate **Commitment to the Process**, which fosters sustained engagement even in the face of setbacks. Over time, these interactions generate a **Shared Understanding** of problems and solutions, leading to the emergence of **Interim Results** that inform further dialogue. This process is continuous and non-linear, reinforcing the model's emphasis on adaptability.

Central to this collaborative mechanism is the concept of Consensus, which is not simply agreement, but a negotiated outcome shaped by interactions among four main stakeholder groups: Central Government, Local Government, Private Sector, and Academic institutions. These actors are connected through a deliberative network depicted by green dashed lines in the figure, symbolizing inclusive negotiation, trust-building, and power balancing. Such engagement enables the co-production of knowledge and policies tailored to the specific needs of the casting industry cluster.

A critical feature of the model is the Feedback Loop, which links Interim Results and Final Outcomes through mechanisms for learning and adaptation. This ensures that policies and strategies remain responsive to changes in context and are continuously improved based on empirical outcomes. The loop is not merely a technical function but a strategic tool for building resilience and long-term sustainability in governance.

Finally, the entire framework is supported by Facilitative Leadership, which underpins each stage of the collaborative process. Rather than exercising top-down control, facilitative leaders act as enablers who foster dialogue, mediate conflicts, and promote problem-solving. In Ceper's industrial cluster, such leadership may emerge from a variety of sources, including local government officials, industry association figures, and even academic intermediaries. The presence of facilitative leadership is especially vital in sectors characterized by informality and weak institutional coordination.

In summary, this model contributes a novel perspective on collaborative governance by positioning structural challenges as catalysts for cooperation, not just barriers to progress. It aligns with emerging literature on polycentric governance and adaptive institutionalism, offering a context-sensitive strategy for managing complexity in industrial development. By incorporating feedback loops, consensus-building, and facilitative leadership, the model provides a practical roadmap for inclusive and sustainable transformation in Indonesia's small-scale manufacturing sectors.

Conclusion

This study analyzed the development of the small-scale metal casting industry cluster in Ceper, Klaten, using the collaborative governance framework of Ansell and Gash (2008). The findings indicate that the limited effectiveness of existing development programs is driven less by technical constraints and more by weaknesses in collaborative governance among government, industry, and academic actors.

Across the five dimensions of collaborative governance, the study identifies unfavorable starting conditions, weak institutional design, underdeveloped collaborative processes, and the absence of sustained facilitative leadership. Resource and power asymmetries, limited access to appropriate financing, outdated industrial data, and low technological and human capital capacity constrain meaningful collaboration. The lack of a formal collaborative forum and shared industrial roadmap further results in fragmented, short-term, and uncoordinated interventions. Consequently, collaborative outcomes remain modest, reflected in stagnant

productivity, limited technology upgrading, weak market integration, and a growing regeneration gap.

To address these challenges, this study proposes a Sustainable Multi-Stakeholder Consensus Collaborative Governance Model that integrates inclusive participation, structured institutional arrangements, facilitative leadership, and sustainability-oriented collaboration. By placing actor consensus and feedback mechanisms at the core of governance, the model extends the collaborative governance framework by emphasizing adaptive learning and long-term continuity. The proposed model offers a practical governance approach for strengthening the resilience and competitiveness of traditional industrial clusters in developing country contexts.

Acknowledgement

We would like to express my deepest gratitude to all parties who have helped and supported us in preparing this journal.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Funding Statement

The authors did not receive support from any organization for the submitted work.

Conflict of interest disclosure

The authors have no relevant financial or non-financial interests to disclose.

References

- A'yun, Q., & Fitriyah, H. (2019). Model pemberdayaan UMKM berbasis corporate social responsibility (CSR). *Jurnal Ekonomi dan Bisnis Islam*, 3(2), 123–137.
- Abdalla, H. F. (2021). COVID-19 and SMEs: Impacts and policy responses in developing countries. *Journal of Development Studies*, 57(4), 645–662.
- Adam, N. A., & Alarifi, G. (2021). Innovation practices for survival of SMEs in the COVID-19 era: The role of digital technologies. *Journal of Innovation and Entrepreneurship*, 10, 15. <https://doi.org/10.1186/s13731-021-00156-6>
- Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, 18(4), 543–571. <https://doi.org/10.1093/jopart/mum032>

- Ardolino, M., Rapaccini, M., Saccani, N., Gaiardelli, P., Crespi, G., & Ruggeri, C. (2022). Digital transformation in SMEs during COVID-19: A multiple case study from Italy. *Technovation*, 117, 102255. <https://doi.org/10.1016/j.technovation.2021.102255>
- Berry, A. (2007). SME competitiveness: The power of networking and subnational location. In D. B. Audretsch, I. Grilo, & A. R. Thurik (Eds.), *Handbook of research on entrepreneurship policy* (pp. 148–162). Edward Elgar.
- Bryson, J. M. (2004). What to do when stakeholders matter: A guide to stakeholder identification and analysis techniques. *Public Management Review*, 6(1), 21–53.
- Darwanto, H., & Danuar, F. (2013). Peran UMKM dalam pembangunan ekonomi daerah. *Jurnal Ekonomi dan Studi Pembangunan*, 14(1), 44–55.
- Emiliani, R., Hartanto, Y., & Wulandari, S. (2021). Strategi penguatan UMKM di tengah pandemi. *Jurnal Manajemen dan Kewirausahaan*, 23(1), 25–32.
- Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory*, 22(1), 1–29.
- Erdin, C., & Ozkaya, G. (2020). Contribution of small and medium enterprises to economic development and quality of life in Turkey. *Heliyon*, 6(2), e03215.
- Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and “Mode 2” to a triple helix of university–industry–government relations. *Research Policy*, 29(2), 109–123.
- Firdausya, A., & Ompusunggu, T. P. (2023). Institutional constraints on SME digitalization in Indonesia. *Journal of Small Business and Enterprise Development*, 30(4), 527–543.
- Fortier, M., & Gamache, M. (2025). Sustainability and resilience in manufacturing SMEs: The role of knowledge and technological alignment. *Journal of Cleaner Production*, 412, 137254. <https://doi.org/10.1016/j.jclepro.2024.137254>
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman Publishing.
- Harrison, J. S., & Freeman, R. E. (1999). Stakeholders, social responsibility, and performance: Empirical evidence and theoretical perspectives. *Academy of Management Journal*, 42(5), 479–485.
- Herawati, N. (2011). Evaluasi program pemberdayaan usaha kecil. *Jurnal Ilmu Administrasi*, 8(1), 55–67.
- Irawan, T. (2017). Kolaborasi pemerintah dan masyarakat dalam pengembangan UMKM. *Jurnal Administrasi Publik*, 13(2), 101–112.
- Juergensen, J., Guimón, J., & Narula, R. (2020). European SMEs amidst the COVID-19 crisis: Assessing impact and policy responses. *Journal of Industrial and Business Economics*, 47(3), 499–510.
- Kementerian Perindustrian. (2019). *Statistik industri manufaktur tahun 2018*. Kementerian Perindustrian Republik Indonesia.
- Kholidah, N., & Hakim, R. A. (2018). Faktor penghambat digitalisasi UMKM. *Jurnal Manajemen dan Bisnis Indonesia*, 14(1), 11–19.

- Mariyudi, M. (2019). Kontribusi sektor industri terhadap pertumbuhan ekonomi daerah di Indonesia. *Jurnal Ekonomi Pembangunan*, 17(2), 145–160.
- Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience. *Academy of Management Review*, 22(4), 853–886.
- Muhyi, H. A., & Chan, A. (2017). Collaborative governance in empowering rural SMEs. *Indonesian Journal of Public Administration*, 3(2), 135–148.
- Putra, M. A. (2021). Peran digitalisasi dalam memperkuat daya saing UMKM Indonesia. *Jurnal Inovasi Ekonomi*, 6(3), 205–215.
- Saleh, S., Widodo, T., & Kusumawardhani, D. (2025). Sustainability orientation and innovation performance of SMEs in Indonesia. *Journal of Small Business Management*, 63(2), 298–316.
- Septa Rinawati, & Sadewo, F. X. (2019). Implementasi kebijakan pemberdayaan usaha kecil di daerah. *Jurnal Administrasi Negara*, 25(1), 79–88.
- Simangunsong, S. A. (2022). Perbandingan kebijakan pengembangan UMKM di Indonesia dan India. *Jurnal Ilmu Pemerintahan*, 9(1), 33–48.
- Slamet, R., Nugroho, E., & Prabowo, H. (2017). Strategi UMKM dalam menghadapi era digital. *Jurnal Ekonomi dan Kewirausahaan*, 17(1), 49–58.
- Solikhin, M. A. (2019). Daya saing usaha kecil menengah di era global. *Jurnal Manajemen Indonesia*, 19(2), 101–110.
- Sudaryanto, T., Swastika, D. K. S., & Rachman, B. (2012). Kontribusi UMKM terhadap perekonomian Indonesia. *Forum Penelitian Agro Ekonomi*, 30(1), 13–28.
- Suci, R. P., Novianti, T., & Nurcahyo, R. (2017). Strategi pengembangan UMKM di Indonesia. *Jurnal Ilmiah Ekonomi*, 9(1), 65–73.
- Tambunan, T. (2006). Perkembangan industri logam kecil di Indonesia. *Buletin Ekonomi Moneter dan Perbankan*, 9(3), 233–248.
- Tambunan, T. (2009). SMEs in Asian developing countries. *Journal of Development Economics*, 4(1), 15–32.
- Tambunan, T. (2011). Usaha mikro, kecil, dan menengah di Indonesia: Isu-isu penting. Salemba Empat.
- Tsai, W. H., & Chou, W. C. (2019). Evaluating sustainable business performance of SMEs. *Journal of Cleaner Production*, 220, 1095–1108.
- Vicario, S., & Nawangpalupi, C. (2020). Collaborative models for SME development in Indonesia. *Jurnal Inovasi dan Kewirausahaan*, 12(3), 191–202.
- Wahyuningrum Putri, S., & Anggraini, M. (2014). Peran UMKM dalam ketahanan ekonomi. *Jurnal Ekonomi dan Pembangunan Indonesia*, 15(1), 23–29.
- Warner, M. (2001). Complex problems, negotiated solutions. *Development in Practice*, 11(5), 637–648.

- Widyani, A. (2013). Ketergantungan UMKM terhadap perusahaan besar dalam model kemitraan. *Jurnal Administrasi Bisnis*, 7(1), 55–66.
- Yudianto, I., Hasanah, U., & Kusnadi, D. (2024). Digital readiness and innovation capability among SMEs. *International Journal of SME Development*, 9(1), 1–15.