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STRENGTHENING INDONESIA'S BEEF SUPPLY CHAIN RESILIENCE: STRATEGIC BUSINESS MODEL DEVELOPMENT FOR CATTLE FATTENING

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Abstract

Background: Indonesia's beef feedlot industry plays a strategic role in national food security; however, it remains constrained by persistent feed shortages, fragmented supply chains, and inconsistent regulatory frameworks. Existing studies have examined these challenges separately but have not produced an integrated strategic business model that aligns policy, technology, markets, and multi-stakeholder collaboration to address them.
Purpose: This study aims to develop a Strategic Business Model Canvas (SBMC) to improve the resilience, sustainability, and competitiveness of Indonesia's feedlot industry by integrating policy coherence, technological adoption, market strengthening, and Quadruple Helix collaboration.
Design/methodology/approach: A qualitative, field-based design was employed using expert interviews, open-ended questionnaires, field observations, and policy document analysis. Data were collected from 20 key stakeholders representing government, industry, academia, and farmer groups across East Java. Open and axial coding were used to identify systemic bottlenecks, which were then mapped into the SBMC framework and validated through methodological triangulation.
Findings/Result: Four structural constraints were identified—feed availability gaps, supply chain inefficiencies, regulatory fragmentation, and weak stakeholder coordination. The proposed SBMC introduces strategic levers including local feed innovation, digital traceability, improved breeder–feedlot integration, and cross-sector partnerships. These mechanisms enhance value creation, reduce import dependency, and strengthen system resilience in line with ESG-oriented agribusiness transformation.
Conclusion: The SBMC developed in this study provides a theory-informed and stakeholder-validated framework that bridges policy design and operational realities in Indonesia's feedlot sector. It offers a practical roadmap for achieving a more inclusive, resilient, and sustainable beef supply chain.
Originality/value (State of the art): This study is the first to develop an empirically grounded SBMC for the Indonesian feedlot industry by integrating the Quadruple Helix model with strategic dimensions of policy, market, technology, and governance. It provides a comprehensive transformation framework with clear operational implications for achieving national food sovereignty.

Keywords: food sovereignty, inclusive agribusiness, Indonesia beef cattle industry, strategic Business Model Canvas (SBMC), quadruple helix collaboration

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INTRODUCTION

Food security in Indonesia is highly dependent on beef cattle farms, which contribute to the national protein intake. However, the industry's high reliance on imports of cattle and meat is proving to leave it vulnerable to global price shocks and supply chains. The development of agricultural business models depends on cooperation across various sectors (Mulyati and Dikky, 2021). Strategic cross-sectoral collaboration is crucial for advancing the beef cattle industry by empowering farmers, creating jobs, and increasing the value of agricultural and livestock outputs. One promising approach is the feedlot system, which enhances operational efficiency and connects farmers with feed suppliers, logistics operators, consumer markets, and regulatory standardization. The corporate farming model aims to enhance efficiency and promote sustainable development by establishing a localized full-cycle beef industry (Casagranda et al. 2023). Nonetheless, the beef industry faces persistent issues such as feed sustainability, dependence on cattle imports, and regulatory instability. Challenges in the feedlot system, such as seasonal feed availability, limited grazing land, poor feed preservation, and volatile feed prices exacerbate the production inefficiencies. Agustiar et al. (2022) find similar problems such as low productivity, high production cost, fragmented value chains, low technology uptake, and dependence on imports. These systemic problems cannot be addressed in isolation; creative and comprehensive responses are required. For example, crop-livestock and plantation livestock system integration, especially for oil palm plantations, may increase feed resources and productivity, particularly in areas with limited land, such as in Java (Syahruddin, 2020; Ali and Tri, 2018). However, the sector is having difficulty achieving self-sufficiency because of structural weaknesses, fragmented supply chains, challenges faced by smallholders, and a lack of coordination. In addition, regulatory interventions, such as Minister of Agriculture Regulation No.41/2019, aimed at protecting local livestock, limit the ability to scale and invest. Smallholders generally have limited access to animal feed, markets, and modern technologies (Priyanti et al. 2010; Sutaryono, 2008).The use of integrated farming systems remains low due to high risks and low-tech adoption (Waldron et al. 2016). According to Rachman et al. (2024), the policy environment and stakeholder cooperation must progress to further support farmers' adaptation and risk management in their businesses. In general, the key to addressing these challenges is to provide an integrated strategy that can solve micro- and macro-problems and thereby improve value chain integration, feed availability, and institutional support.

The beef cattle industry in Indonesia is an essential component of the food and protein supply for the nation. It is structurally weak due to its dependence on imported cattle and beef, which ties it to global market volatility, supply chains, and geopolitical hazards. Research has shown that continuing production problems, such as low productivity, high cost of production, fragmented value chains, and low level of adoption of improved feed and breeding techniques (Agustiar et al. 2022; Waldron et al. 2016). In fact, various policies aimed at improving the domestic livestock sector, including Minister of Agriculture Regulation No.41/2019, sometimes hinder industry expansion and private sector investments. Production systems relying on smallholder farmers with restricted access to quality feed supply, market lines, and technology are constrained in terms of efficiency and competitiveness (Priyanti et al. 2010; Sutaryono, 2008). Seasonal changes in feed supply (shortened grazing days), smaller grazing areas, and fluctuating feed and beef prices also adversely threaten the long-term sustainability of these lands. Nevertheless, integrative schemes such as crop-livestock systems (Singh, 2019) and plantation-livestock systems (e.g., in oil palm plantations) (Syahruddin, 2020; Ali and Tri, 2018) may improve feed security and land-use efficiency, even if still in an embryonic stage, because Indonesia's institutions tend to be highly fragmented and not strategically coordinated. Existing studies generally consider only isolated operations or technical elements rather than the context of a consistent and adaptive strategy that would allow for alignment with cross-sectoral governance and long-term sustainability issues. Furthermore, most previous studies fail to consider the local socioeconomic context and informality when designing systems, thus lowering the likelihood of implementing solutions. This discussion highlights a significant absence in the literature: there appears to be no single business model that systematically integrates policy dimensions, stakeholder engagement, technology deployment, and supply chain resilience, as in Indonesia.

Both systemic and structural problems are constraining the potential of the beef cattle industry in Indonesia to become a sustainable and competitive business. The industry's heavy reliance on imported meat and

feeder cattle also makes it vulnerable to trade-policy uncertainty, international price fluctuations, and geopolitical issues. This reliance detracts from local producer self-reliance and national food security objectives. The most serious problem in the beef cattle value chain is the separation of that chain by non-cooperation among breeders, feed suppliers, a logistics company, processors, and market players. Its fragmentation has also resulted in reduced competitiveness, higher transaction costs and inefficiency. Smallholder farmers dominate industry but face challenges such as low productivity, high production costs, poor quality feeds, limited access to grazing land and incidences of non-adoption of modern feed technology. The feed pattern and cost factors of the ration are compounded by the seasonal variation of feed both in cost and availability. Regulatory uncertainty and policy incoherencies including domestic protection measures, import restrictions of cattle (e.g. Ministry of Agriculture Regulation No. 41/2019) are additional burden on sectoral growth and investment. The government has installed protective barriers to support domestic manufacturing, but often they are unaccompanied by the positive institutional environment and economic incentives required for long-term innovation and scale-up. In addition, the gap between the operation and policy domains is exacerbated by a lack of a common and strategic business model. While technological innovation, market systems and institutional coordination were still researched but the main necessity of systematic strategic framework integrative them have not been developed in the literature to date and the current research focuses on some technical or operational factors only. The absence of multimodal collaboration, for example between government, business, university, and farmers, becomes key challenge for change in the sector. Therefore, although prior studies have examined various technical, institutional, and market issues, none has developed an integrated strategic framework that bridges the gap between policy design and operational realities across the value chain; this gap is what the present study seeks to address through the development of a Strategic Business Model Canvas (SBMC).

This study aims to develop a SBMC based on empirical data and qualitative open questionnaires with key stakeholders from the feedlot industry to address this gap. This model is expected to serve as a reference for setting the strategic direction to develop more resilient, adaptive, and sustainable beef cattle fattening business in Indonesia. Moreover, this study develops a SBMC that promotes an adaptive, collaborative, and sustainability-oriented business approach in the feedlot industry. This research aspires to provide an adaptive, integrative, and sustainable SBMC for the feedlot sector in Indonesia to overcome these critical challenges, including increasing dependency on imports, fragmented supply chains, and low productivity in the local sector. The SBMC was developed in collaboration with various sectors and was informed by data from the field and local experts. It emphasizes cost-effective approaches to improve feed availability, increase supply chain resilience, and align stakeholder interests across industries, government, academia, and farming communities. The SBMC provides a strategic foundation for developing a resilient, competitive, and self-reliant national beef industry. Enhancing local feed production, reducing reliance on imports, reconnecting with agriculture as a solution, and developing more sustainable feed technologies are among the recommendations. Aligning supply, logistics, and production integration and reducing costs are also vital. It will take Inclusive multi-stakeholder collaboration and evidence-based action are required to realize these goals. Policies of incentives, infrastructure development, and enactment of streamlined import controls would help the feedlot industry take full advantage of the SBMC and realize such a development agenda that would enhance the national competitive stature and better support long-term agro-food security.

Most studies overlook the need for a structured business model for integrative policies, technological innovations, and market systems. Previous studies have focused on operational and technical aspects separately and have not yet integrated a mature strategic management framework to ensure overall sustainability and resilience across the entire feedlot industry. The strategic dimensions of the feed value chain have been less examined, particularly from economic, technological, and regulatory perspectives. This study builds on this approach to address these limitations and proposes a more integrated and holistic framework to fill this gap. This study aims to address this gap by proposing a SBMC for Indonesian feedlot businesses. The SBMC is an evidence-based, field data- and stakeholder-informed approach that is conceptually grounded within the Integrated Value Chain Resilience framework for food sovereignty. Both the four quadrants of changing the status quo in cattle fattening and the quadruple helix model that the four-

quadrant model is based on encourage sustainability, inclusivity, and competitiveness in the feedlot sector, connecting the market, innovating feed technology and policy, and integrating stakeholders across sectors.

This study contributes to the understanding of the Business Model Canvas (BMC) in Indonesian cattle feedlot systems by addressing structural realities, cross-sector dynamics, local constraints, and the roles of informal actors. This study contributes to strengthening this framework by combining fragmented layers (economic, technological, regulatory, environmental, and governance) into an actionable SBMC. The model is derived from real-world practice, informed by qualitative findings from 20 stakeholders, which, together with policy analysis and fieldwork, underlines its applicability and accessibility to users. The other contribution of this research is that it introduces a new model of governance founded on the quadruple helix, and aims to systemically collaborate with government, industry, academia, and farmers. Another novelty is the addition of a new governance model based on a quadruple-helix model enabling systemic collaboration between government, industry, academia, and farmers. Finally, the SBMC has a strong strategic focus and has gone beyond descriptive mapping to propose targeted interventions to increase feed availability, decrease dependence on imports, foster value chain integration, and accelerate technology adoption, which are key for the long-term sustainability and competitiveness of the beef industry. This contribution is particularly relevant because of the industry's inherent historical structural inefficiencies.

Supply chains are divided into segments, and such transformation and the resulting vacuum or loose arrangement of rearing, feeding, and processing agencies are the causes of inefficiencies and the loss of the capacity to maintain competitive advantage (Mahbubi and Uchiyama, 2020). In this study, we adopted an integrative approach that combines operational processes and stakeholder participation to engage directly with the sources of systemic inefficiency and strategic misdirection. The approach of this study is integral, focusing on operational processes and stakeholder involvement to pinpoint the underlying factors of the problem: fragmented systems of the breeding, feed supply, and processing chain and lack of collaboration.

METHODS

The study was conducted in East Java, Indonesia, between January and March 2025. The participating enterprises came from ten districts: Sumenep, Tuban, Probolinggo, Bojonegoro, Jember, Bangkalan, Sampang, Malang, Kediri, and Bondowoso. The study used expert judgment (expert survey) through structured questionnaires distributed to selected experts. The questionnaire was envisaged to be completed once without iterative rounds, enabling direct gathering of expert views that address the key aims of the study. The purpose was to collect experts' thoughts or judgments to obtain information or confirmation from practitioners with real experience in the Indonesian feedlot business. The respondents were experts in the beef cattle business.

Primary data were obtained through direct observation, interviews, and expert analysis. Direct observations and interviews were conducted during the activities of sourcing cattle feed, providing feed to fattening cattle, and business processes. The primary data were supplemented with relevant policy documents, industry reports, and field observations. Secondary data were utilized in external analysis (opportunities and threats) and to support the strategy that would be developed. The secondary data used included data from the Central Bureau of Statistics, data on political, economic, social, and technological developments, and data on business competition. This information can be acquired through websites, books, articles, e-books, journals, and other sources.

Primary data were collected by sending qualitative open-ended questionnaires to stakeholders in the quadruple helix (government representatives, business professionals, academic researchers, and farmer groups) (Table 1). This approach was used to record subtle, contextual views on the sector's opportunities, strategic challenges, and lived experiences, which are often missing in standard survey designs. The present study has a small sample of 20 participants and works on a qualitative research methodology paradigm, where the focus is on obtaining rich, complex, and detailed data rather than statistical generalizability. Key informants were chosen from each category of stakeholders involved in the quadruple helix (i.e., government officials, entrepreneurs, academics, and farmers) to represent various stakeholder groups and experiences in the beef cattle sector in Indonesia.

Table 1. Types and sources of data strengthening Indonesia's beef supply chain resilience: strategic business model development for cattle fattening

Type of Data	Description
Qualitative Data	Rich, descriptive data collected from qualitative open-ended questionnaires, expert insights, and literature.
Empirical Data	Real-world data collected directly from the field to reflect conditions in the Indonesian feedlot sector.
Secondary Data	Data obtained from existing reports, regulations, academic literature, and government documents.
Policy Data	Information related to government regulations, interventions, and policy frameworks (e.g., Minister of Agriculture Regulation No. 41/2019).
Stakeholder Perspectives	Inputs from main stakeholders such as feedlot operators, policymakers, academics, and farmers.

Secondary data was collected through reviewing the selected policy and regulatory documents as well as by collecting printed materials including local and national agricultural policies, trade statistics and development plans of organizations like FAO, BPS and Bappenas. The study was introduced through a general literature review of academic journals, white papers, and industry reports to position the research within the wider field of literature and identify any gaps in the existing research. When possible, observations in the field were also made to confirm stakeholders' accounts and document field realities related to feed management, logistical systems and operating procedures. Overall, these processes function simultaneously to formulate the SBMC to produce an empirically, contextually, and strategically responsive SBMC to the complex and dynamic nature of Indonesian beef cattle.

We conducted a thematic analysis using open and axial coding techniques. In the first step, line-by-line open coding of all interview transcripts was conducted to develop meaningful units of text. For example, "Feed is difficult to come across during the dry season" was coded as a feed access challenge, and "We don't know who is responsible for logistics" as a coordination gap. Axial coding was then employed to classify similar codes into a few larger categories according to causal conditions, context, action strategies, and consequences. This phase resulted in four overarching themes: feed availability constraints, supply chain inefficiencies, regulatory fragmentation, and stakeholder coordination gaps. Incorporating partners, resources, value propositions, and external enablers, the SBMC provides an opportunity to link empirical results to business strategy blocks. To further strengthen the reliability and validity of our findings, we triangulated the method using three types of data: (i) qualitative interviews with the relevant stakeholders, (ii) direct observations from the field, with special attention to logistics and the quality of feeds, and (iii) secondary documents, including the Ministry of Agriculture Regulation No. 41/2019, BPS, and industry reports from FAO and Bappenas (2017). Methodological triangulation draws on different research methods to shed light on where the evidence converges and reduce threats, particularly those associated with single-method research. We obtained rigorous convergence of evidence by comparing emergent themes from the interviews, such as feed scarcity during the dry season and regulatory overlap, with real-world observations of logistical bottlenecks and documentary evidence of policy inconsistencies. The cross-validation procedure ensured that stakeholder assertions were factual evidence, enhancing the trustworthiness and credibility of our themes. This study utilized a convergent triangulation technique to reconcile discrepancies between interviews, observations, and secondary sources through a systematic process of comparison. In the case of discrepancies, a three-step process was used. The initial analysis considered the contextual factors of each data point, including time, location, and informant background. Second, contradictions, which represented conflicting stakeholder opinions or structural data deficiencies, were retained and investigated for potential insights. Third, unexplained contradictions, particularly those related to systemic complexity in the cattle ranching sector, were noted for further interpretation as theoretically important exceptions. This procedure constituted a reciprocal sharp response between the study and the variation in the data, and at the same time, a robust and credible analysis.

The ontological basis for the SBMC was born out of the view of the Business Model Canvas (BMC) as a representation of the dynamic system that is the source of value-creating elements, not a static blueprint. The conventional BMC was expanded to include

strategic dimensions (policy, market, technology, and governance) and connected with the Quadruple Helix Innovation Model to represent multi-actor collaboration and institutional complexity in the livestock sector. The research framework is illustrated in Figure 1 illustrates the conceptual model to form a sustainable approach in the feedlot business. This framework highlights strategic levels, such as stakeholder engagement, value co-creation, and ESG integration, as critical paths to resilience and competitive advantage. Figure 2 ventures from an initial state aimed at distinguishing the primary bottlenecks in the feedlot sector. It then unfolds through data gathering work and thematic analysis to utilize the logic model as a diagnostic and planning mechanism. Thus, the resulting strategic advice is not only rooted in theory but can also be promptly translated into practical solutions by considering the institutional, technical, and market-related blockades fully and contextually. Table 2 presents a matrix focusing on strategic interactions between technology, markets, policy, and a quad-helix cooperation model among governments, academia, business, and societies.

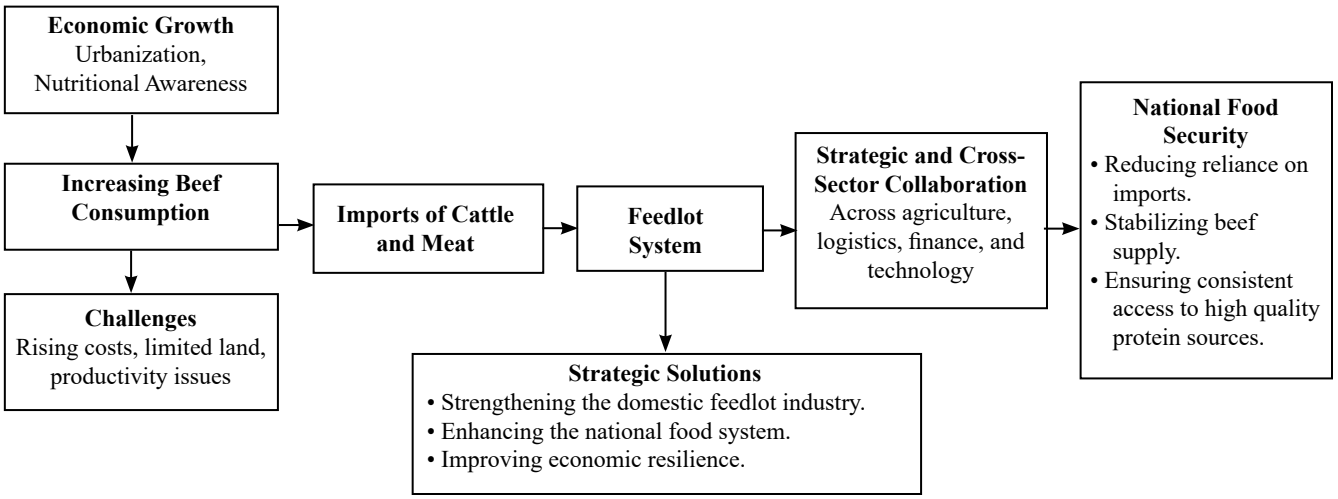

Figure 1. Strategic framework for strengthening the beef supply chain and national food security

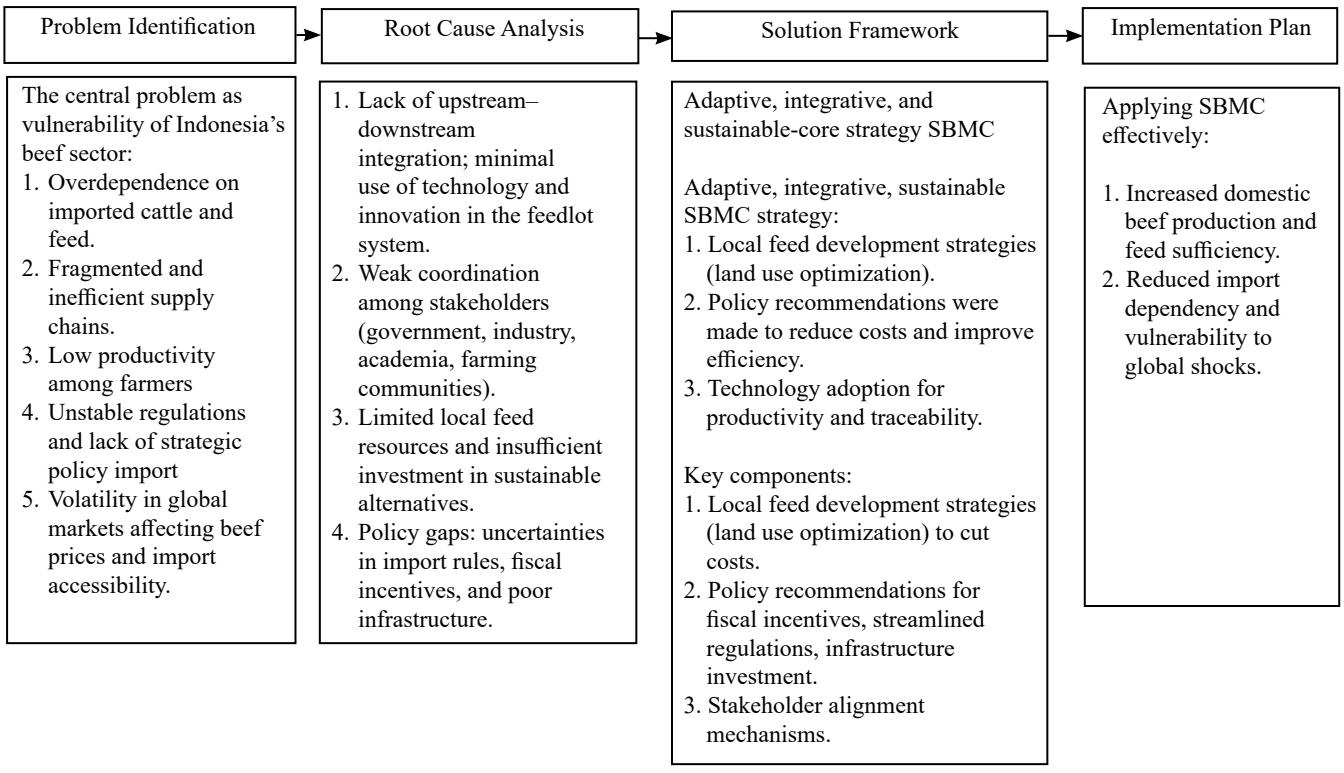

Figure 2. Approach problem solving

Table 2. Policy, technology, markets, and quad-helix collaboration matrix

	Policy	Technology	Markets	Quad-Helix Collaboration
Policy	Rules and incentives set by government.	Technology adoption policies.	Regulations for market needs (e.g., carbon credit, fintech).	Public-Private Partnerships, policy laboratories and innovation councils.
Technology	Regulatory technology (e.g. digital identity, cybersecurity laws).	Core innovations (AI, IoT, blockchain, green energy).	Technology is no longer the answer to the market.	
Market	Policy creates demand (e.g., subsidies, carbon taxes).	Technology disruption opens new markets.	Demand-driven innovation.	Co-creation of solutions; hackathons, living labs, regional innovation hubs.
Quad-Helix Collaboration	Inter-sectoral policy making and all four actors shape law.	Technology ecosystems where government, universities, companies and citizens work together.	As the collaborative federated ecosystems drive new business models.	

RESULTS

Table 3 presents the four key strategic dimensions (Policy, Technology, Market, and Quadruple Helix Collaboration) that have been critically evaluated against the challenges and opportunities in the cattle feedlot sector. The dimensions comprise categories for regulatory drivers, investment in environmentally sound technologies, local and export market demand, and government, industry, academia, and civil society collaboration, based on the theoretical foundation of the Innovation Helix model. The matrix illustrates the interplay among these dimensions and shows that the convergence of public policy, emerging technologies, market forces, and collaboration networks combine to create a strategic base to drive supply chain sustainability, competitiveness, and system resilience. As a modular framework, Table 3 serves as a conceptual basis for developing the Strategic Business Model Canvas (SBMC), ensuring that all actors and aspects are systematically integrated into the strategic model. Table 4 compares the current SBMC to the proposed one, highlighting strategic gaps in value proposition, distribution channels, key alliances, cost structure, and additional dimensions. The future SBMC incorporates feed quality control technology, local network development, and increased digitalization. Each gap is accompanied by implementation recommendations: strengthening institutional partnerships, improving regulatory incentives, and activating Quadruple Helix collaboration mechanisms. This opens a clear transition path from the existing situation to a more resilient, adaptive, and collaborative business model. Together, these two tables reinforce the claim that the developed SBMC is not only based on empirical data but also objectively maps changes and provides operationalizable strategic recommendations. Thus, this model is not only theoretically relevant but also has potential for practical implementation in the Indonesian cattle farming sector.

A growing number of experts now recognize inclusive agribusiness models as essential for both food security solutions and smallholder farmer well-being (Wangu 2021; Schoneveld 2022). The purpose of these models is to connect smallholders to commercial value chains through market access, input provision, and technological support (Tinsley and Agapitova, 2018). Inclusive agribusiness requires a comprehensive system-based method that considers household variations and systemic inequalities to generate substantial changes (Wangu, 2021; Schoneveld, 2022). Through this approach, inclusive agribusiness can achieve genuinely sustainable and equitable development outcomes for smallholder farmers. The assessment of the current and required models demonstrates the fundamental need for strategic actions to address operational and structural gaps in the domestic beef cattle sector. The research findings establish a base for developing adaptable plans that address operational efficiency, stakeholder collaboration, policy assistance, technology implementation, and market reach within a quad-helix framework.

Table 3. Strategic dimensions matrix for Indonesia's beef cattle

Dimension	Current Challenges	Strategic Opportunity	Quadruple-Helix Collaboration Needed
Policy	Disintegrated policies, short-term focus, and lack of local-incentive emphasis.	Policy coordination for the long-term, reforming incentives, support for local feedlot investment.	Government, Industry
Technology	Feed and farm tech have low adoption; digital infrastructure is underdeveloped.	Favor the development of intelligent feeding systems, digital traceability, tech transfer assistance.	Academia, Industry
Market	Price volatility, reliance on imports, poor market access for smallholders.	Local organization of market, Integration of value chains, Halal and quality certification schemes.	Industry, Farmers
Stakeholder Collaboration	Low coordination, concentration of a few actors, neglect of smallholders.	Quadruple-helix model, inclusive partnerships, co-innovation platforms.	Government, Industry, Academia, Farmers

Table 4. Comparative Strategic Business Model Canvas (SBMC) and gap analysis

SBMC Component	Existing Model	Ideal Model	Strategic Gap Identified
Key Partners	Disjoined actors, low trust, loose breeder-feedlot connection.	Performed well value chain synergies, Public–Private Partnership (PPP) cooperatives, strong breeder-feedlot linkages.	Lack of cooperation among the stakeholders.
Key Activities	Primitive fattening, responsive procurement, low-tech business.	One-step breeding–fattening, digital traceability, waste to feed innovation.	Lack of technology and innovation adoption.
Key Resources	Cattle and feed were not domesticated, access to credit and land was restricted.	Feed sources close to home, tech support, infrastructure investment.	Failure to realize the utopian possibilities and excessive reliance on imports.
Value Propositions	Commodity-oriented, low differentiation.	Good quality, visible source, halal certified beef and environmental and social benefit.	Lack of competition and weak branding.
Customer Segments	Middlemen, bulk buyers	Retailers, modern markets, institutional buyers.	Limited access to high-value, cutting-edge markets.
Channels	Traditional market chains, inconsistent distribution.	Transparent digital platforms, regional consolidation centers.	Poor market intelligence and poor logistics.
Customer Relationships	Transactional, price driven.	Trust-based, long-term contracts, service-oriented.	Lack of loyalty mechanisms and low levels of trust.
Revenue Streams	Volume-based, highly volatile.	Diversified: premium pricing, carbon credits, by product utilization.	Inability to realize the value capture and unpredictable revenues.
Cost Structure	Feed and input prices are up, seasonal inefficiencies obvious.	The related costs are minimized, for example by local feeding, common logistics, and digital monitoring.	High operation inefficiencies.
External Enablers	Disjointed support, unclear policy alignment.	Supportive environment (finance, policy, infrastructure, innovation) included viewing this combination as a whole system.	Unbalanced enabling environment and scattered support.

A synthesis of key elements

The Indonesian feedlot industry depends heavily on cooperatives that implement business models that include inclusivity, agricultural residue utilization, productivity enhancements, and farmer support. The essential participants in this industry include regulatory bodies, technology suppliers, smallholder farmers, commercial feedlot operators, and meat supply chain handlers. The industry value chain benefits from cooperatives working with digital platforms and policy intermediaries to achieve revenue diversification and sustainable relationship development. The development of this industry depends on cooperative relationships between the government, academia, industry sectors, and rural communities using the quadruple helix framework.

Cross-Cutting Strategic Themes

Four interrelated strategic imperatives that pervaded the stakeholders' stories and are representative of the multiple demands of the Indonesian livestock fattening business underpin the SBMC. Policy coherence brings a stable and supportive policy environment that ensures that corporate practice is consistent with existing legal conditions through applicable Law No. 18/2009 and Ministry of Agriculture No. 02/2017. Integrating value chains fosters dialogue and partnerships between upstream producers and downstream market players so that they can break away from the historical fragmentation of the sector and achieve more effective and efficient operations. To achieve a future-proof industry that can cope with external changes and environmental degradation, the two aspects of resilience and sustainability focus on the strategic utilization of locally available resources, adaptive technologies, and the implementation of environmentally good practices. Finally, by mainstreaming equity and shared value in institutional options, inclusive and shared growth ensures the participation of smallholders and marginalized stakeholders, ensuring that sectoral growth is broadly shared and socially transformative. These requirements can be mutually supportive in providing a strong foundation for systemic change; hence, the SBMC is a powerful tool for steering the evolution of Indonesia's feedlot sector.

Strategy Recommendations (Transformation Levers)

The sustainability of the beef value chain has benefited from recent research that has introduced various enhancement strategies. These strategies emphasize the development of scientific models and evaluation tools, promote stakeholder collaboration, and improve information sharing (Maia de Souza et al. 2017). Strategic shifts are needed to strengthen the sustainability of the beef cattle industry, particularly in the feedlot sector. These include establishing robust regional breeding systems, encouraging farmer integration, building digital infrastructure, implementing green incentives, and generating revenue through carbon credits and ecosystem services. These measures will help reduce dependence on imported feeds and animals. However, to maximize their benefits, producers require better decision-support tools, while the industry generally requires operating protocols on emission reduction incentives and productive management practices that result in lower emissions (Gilreath, 2024).

Key Innovations in SBMC Feedlot Indonesia

The beef cattle industry can be made sustainable and competitive by optimizing the digital value chain, locally produced animal feed, and diversified business models. By utilizing crop residues and agro-industry by-products, reducing import dependency, and leveraging IoT technology, small feedlot operators can become more efficient. Opening up to local communities, industry, academia, and government can enable cross-sectoral relationships and innovations. Sustainable practices enable economic sustainability and revenue generation. According to Saleh and Azimi (2025), sustainability has become a strategic necessity that boosts competitive advantage, resilience, and stakeholder confidence, rather than a mere legal duty.

Implications for Business and Strategy

This study suggests that the way business is done will need to change; no more business as usual and the cost cutting, import dependence, and middlemen-led markets that go with it for the private sector. The SBMC recommends a move towards more inclusive, digitized, and circular models that are not only more resilient but also more aligned with recent public policy and global market trends. This, for agribusiness leaders and feedlot managers, is nothing short of embracing partnerships

with cooperatives, digital tools, sustainable feed technologies, and working with regulatory agencies. This also means redefining value, not by volume or a price tag, but by long-term competitive advantage, local strength, and better environmental outcomes. This study addresses the concern of providing a full-scope SBMC based on an evidence base of empirical fieldwork and a process to ensure stakeholder input from all areas of the quadruple helix: government, industry, academia, and farmer communities. The SBMC established a framework that addresses fundamental systemic limitations, including heavy import dependency and supply chain fragmentation, along with limited technology implementation and inadequate policy alignment. This study employs the Integrated Value Chain Resilience Framework as its theoretical foundation because it demonstrates how policy coherence, technological innovation, market responsiveness, and multi-actor collaboration combine to boost food system resilience. Moreover, the utilization of the Business Model Canvas (BMC) in a strategic dimension complies with Muhammad et al. (2023), who draw attention to the benefits of BMCs with respect to system-level integration, stakeholder coordination, and long-term competitiveness in livestock systems. Incorporating objectives with the SBMC connects the realities of operations to the underlying value proposition in relation to inclusive growth and access to technology. Invest in feed innovation based on agricultural residues, digital extrapolation to access the market, and transparency and circular movement in managing the environment. According to Asikin et al. (2020), the domestic beef industry needs new innovative approaches to support its production through smallholder cattle systems that form the essential base to meet consumer demand. These mechanisms are consistent with Indonesia's agenda for national food sovereignty and support the development of ESG-based agribusiness models.

Managerial Implications

This study provides an integrated set of managerial implications for policymakers, agribusiness managers, and industry stakeholders with the main purpose to develop a more resilient and sustainable beef cattle industry in Indonesia. The first is the institutional and regulatory footing that is required, and regulatory harmony with Law No. 18/2009 and Ministry of Agriculture Regulation No. 02/2017, will allow the transition to systemic transformation of the feedlot industry and reduce dependence on imported feed inputs. Second, managers must induce quadruple helix cooperation among the government, academia, industry, and smallholders to drive joint creation, shared innovation, and collective value creation. Third, in Digital-Sustainable Business Models (DSBM), as described by Palmié et al. (2025), it becomes possible for firms to infuse digitalization and sustainability into strategic operations while unblocking new revenue streams through green certification and carbon credit markets. It also involves promoting inclusive business models – managerial choices that ensure the participation of smallholders, cooperatives, and marginalized actors to increase the equity and resilience of supply chains, in line with the SBMC framework. Improvement and development of local feed systems is the second priority, requiring investment in agro-industrial byproduct utilization, precision feeding, and regionalized feed hubs, hopefully facilitated by cross-sector collaboration. Moreover, sustainable development is largely reliant on human capital; managers should therefore consider direct investments in capacity-building initiatives that empower smallholders and technical staff to be the driving force behind the adoption of modern, sustainable, and digital agricultural practices that will help increase productivity and secure social inclusion. Finally, managers must diversify their market access and revenue opportunities. This can be achieved by catering to non-traditional buyer types (such as modern retail chains, institutions, and digital platforms) and value-added and ecosystem service monetization to enhance financial resilience and competitiveness. Taken together, these managerial approaches will help shape a more integrated, productive, and resilient beef cattle industry in Indonesia.

CONCLUSION AND RECOMMENDATIONS

Conclusions

The Strategic Business Model Canvas (SBMC) suggested in this study is theoretically supported by the Integrated Value Chain Resilience Framework. It expands and integrates the key considerations of the Business Model Canvas (BMC), particularly regarding value co-creation, stakeholder inclusion, and strategic agility. The central elements of the theory of inclusive agribusiness are operationalized in empirical results as sensitive assumptions and support the original findings of Schoneveld (2022) and Wangu (2021), who argue

for systematic and multi-perspective approaches to smallholding integrated into commercial value chains. The SBMC encourages quadruple-helix cooperation and shared values, which supports Muhammad et al. 's(2023) assertion that strategic business models can be used to integrate and systemize competitive networks in the cattle industry. The SBMC presents a resilience-oriented transformation paradigm by introducing key levers aligned with the global sustainability narrative, such as feed innovation, digital traceability, and the monetization of ecosystem services (Gilreath, 2024; Maia de Souza et al. 2017).This is done by requiring centralized and semantically motivated progress towards substantial social wealth creation and a shift towards comprehensive and new forms of social inclusion (Luigino, 2018).By identifying, supporting, and prioritizing Indonesia's national aspirations to achieve food sovereignty and develop ESG agribusiness, the SBMC has fostered the development of inclusive and sustainable beef cattle feedlots (Asikin et al. 2020).

Based on this theoretical framework, a comparison of the SBMC will help researchers identify system bottlenecks in the Indonesian feedlot industry and translate theory into practice, that is, theoretical principles such as shared value creation, strategic flexibility, and the Quadruple Helix approach. A stakeholder-based diagnostic of Indonesia's feedlot industry emerges through a Strategic Business Model Canvas (SBMC) comparative analysis, which uncovers fundamental systemic barriers such as economic, technical, institutional, and policy-related factors that restrain innovation, sustainability, and competitiveness. This study uses qualitative data from government, industry, academia, and smallholder actors to demonstrate how the current model is fragmented and inefficient and to offer a circular agriculture-based system that supports digital transformation and ESG goals. The proposed SBMC advances both practical implementation and theoretical development for building resilient local feedlot systems that compete in the global market while empowering Indonesian communities. This study develops a stakeholder-engaged assessment of the Indonesian feedlot industry using the Strategic Business Model Canvas (SBMC) to compare different models and uncover fundamental systemic constraints that impede innovation, sustainability, and market competitiveness. Through the analysis of qualitative data from government, industry, academia, and smallholder actors, the study demonstrates current model fragmentation and inefficiencies, before presenting an actionable framework that enables circular agriculture through digital transformation and ESG priorities. The proposed SBMC serves as a practical implementation tool for this purpose. Consequently, the comparative SBMC analysis grounded in qualitative insights from the government, industry, academia, and smallholders serves as the empirical foundation for the study's concluding assertions, which underscore both systemic impediments and the strategic imperative for inclusive, digitally empowered, and ESG-aligned business models. The conclusion highlights the systemic issues facing the feedlot industry in Indonesia, including regulatory fragmentation, limited value chain integration, and limited innovation uptake. Using the Strategic Business Model Canvas (SBMC), this study supports earlier evidence pointing to the requirement of inclusive sustainable-focused business models that resonate with digital transformation and ESG approaches. Finally, we contribute to the existing literature by providing a synthesized and stakeholder-informed model that brings these ideas to life by turning them into actionable strategies, thus strengthening theoretical claims and offering practical directions for implementation. The SBMC does not contradict these viewpoints; instead, it combines and refines them to create a comprehensive theory of industrial transformation that is specific to the situation.

Recommendations

The findings of this study demonstrate that the Strategic Business Model Canvas (SBMC) serves as an effective strategic roadmap for transforming Indonesia's feedlot sector into a more secure, competitive, and sustainable industry. By embedding the SBMC into institutional frameworks, policymakers and agribusiness leaders can drive systemic changes that benefit producers, consumers, and the broader economy. Central to this transformation is the need for regulatory coherence, particularly the alignment between Law No. 18/2009 and Ministry of Agriculture Regulation No. 02/2017, which can create a more enabling environment for feedlot development and reduce reliance on imported feed. Furthermore, advancing digital infrastructure, including cold chain systems and waste-to-feed technologies, is essential for improving traceability and long-term sustainability in the livestock sector. The development of cooperative business models underpinned by Quadruple Helix collaboration among farmers, industry actors, academic institutions, and

government bodies enables inclusive innovation and shared value creation. In this context, the adoption of the Digital-Sustainable Business Model (DSBM), which focuses on value proposition, value creation and delivery, and value capture (Palmié et al. 2025), offers a practical approach for integrating sustainability goals through digital technologies. For such models to thrive, diversified revenue sources, such as digital platforms, green certification programs, and carbon credit trading, are essential for building economic resilience. Finally, comprehensive capacity-building programs targeting smallholder farmers and technical personnel are vital for boosting productivity, enhancing adaptive capabilities, and ensuring the successful implementation of sustainable and digitally enabled practices. Collectively, these strategies offer a structured and inclusive pathway toward a resilient, modernized, and ESG-aligned beef cattle industry in Indonesia.

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