



Sustainability of Local Poultry Farming in Southeast Asia: A Triple Bottom Line Systematic Review

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Abstract | The sustainability of local poultry businesses in Southeast Asia is gaining increasing attention due to their contribution to food security, rural economies, and natural resource conservation. However, related research remains fragmented and tends to focus on a single aspect, necessitating a systematic review based on the Triple Bottom Line (TBL) framework to obtain a more comprehensive picture of sustainability. This systematic review followed the PRISMA 2020 guidelines and conducted a search of Scopus, Web of Science, and ScienceDirect (November 19, 2025) to identify primary studies assessing the sustainability of local poultry businesses in Southeast Asia. Of the 59 initial records, four studies met the inclusion criteria and were analyzed in depth using a narrative thematic synthesis approach. The results indicate that the economic dimension was the most dominant focus, particularly related to profitability, feed costs, business efficiency, and the economic impact of reducing antimicrobial use and agritourism. The social dimension was reflected in studies of community cohesion, cultural values, and farmer norms and motivations for adopting circular economy practices, although empirical evidence remains limited. The environmental dimension primarily relates to antimicrobial use and the risk of antimicrobial resistance, as well as organic waste management through circular economy practices. Overall, research on the sustainability of local poultry in Southeast Asia remains focused on economic aspects, while studies that integrate social and environmental dimensions within a single TBL framework are rare. This review highlights the need for multidisciplinary research and more comprehensive study designs to understand the interrelationships between sustainability dimensions and provide a scientific basis for policies and interventions to strengthen the resilience of local poultry enterprises.

Keywords | Local poultry, Sustainability, Triple bottom line, Southeast Asia, Systematic review.

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INTRODUCTION

Local poultry plays a vital role in food systems and livelihoods in various developing countries, including Southeast Asia (Suwannasri and Promphakping, 2022).

Local poultry farming systems are generally household-based or small-scale, characterized by adaptability, low input requirements, and integration with traditional farming practices (Birhanu *et al.*, 2023). Local poultry provides a source of animal protein, supplemental income, and holds

cultural and social value for rural communities (Grace *et al.*, 2024). This strategic role makes the sustainability of local poultry businesses an increasingly relevant issue in discussions of sustainable agricultural development (Goswami *et al.*, 2016).

The Triple Bottom Line (TBL) concept, introduced by Elkington (1998), offers a comprehensive analytical framework for evaluating sustainability across three main dimensions: Economic (profit), social (people), and environmental (planet). This approach emphasizes that the performance of a sustainable business is measured not only by financial returns but also by its contribution to social welfare and environmental conservation. In the context of local poultry farming, TBL allows for assessment of business profitability, its contribution to community well-being, and its impact on ecosystems and natural resource use (Estoque and Murayama, 2014; Suwannasri and Promphakping, 2022). Thus, TBL theory provides a more holistic perspective in assessing sustainability, especially in production systems that have a close relationship between ecological, social, and economic factors (Mukherjee *et al.*, 2024).

While there are numerous studies on local poultry in Southeast Asia, most focus on a single aspect, such as production performance, animal health, or economic factors (Birhanu *et al.*, 2023). Studies integrating all three dimensions of sustainability are still very limited (Mukherjee *et al.*, 2024), thus hindering a comprehensive picture of the sustainability of local poultry businesses. Furthermore, there has been no systematic review specifically addressing the sustainability of local poultry using the TBL framework in the Southeast Asian context (Estoque and Murayama, 2014).

Systematic reviews using the TBL approach are crucial for consolidating research findings, which are currently scattered and fragmented (Mukherjee *et al.*, 2024). This approach can provide a more comprehensive understanding of the factors that support and hinder the sustainability of local poultry businesses (Goswami *et al.*, 2016). Furthermore, the review results can provide a basis for policy formulation, intervention program development, and strengthening farmer capacity to make their businesses more resilient and adaptive.

Against this background, this systematic review aims to synthesize empirical evidence on the sustainability of local poultry businesses in Southeast Asia using the Triple Bottom Line framework (Estoque and Murayama, 2014). The review identifies commonly used sustainability indicators, maps key findings across each dimension, and highlights remaining research gaps (Mukherjee *et al.*, 2024). Thus, this study makes an important contribution to enriching the literature on local poultry while offering a scientific basis for decision-making and future research development (Suwannasri and Promphakping, 2022).

MATERIALS AND METHODS

REVIEW DESIGN AND PROTOCOL

This systematic review was developed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (2020) guidelines for identifying, evaluating, and synthesizing empirical evidence on the sustainability of local poultry enterprises in Southeast Asia using the Triple Bottom Line (TBL) framework. All review steps were conducted systematically, transparently, and in accordance with international SLR reporting standards, with no protocol modifications during the process.

INCLUSION AND EXCLUSION CRITERIA

Selection criteria were established using the population, phenomenon of interest, and context (PICo) framework to ensure that included studies were relevant to the population, focus of the study, and geographic context. Accepted studies included English-language primary research articles examining local poultry systems, including native chicken, indigenous chicken, village poultry, or backyard poultry, and assessing sustainability indicators across one or more of the TBL dimensions: economic, social, or environmental. Studies had to be conducted in Southeast Asian countries and available in full-text form. Studies were excluded if they focused on industrial-scale commercial poultry, did not measure sustainability indicators, were non-empirical publications such as review articles or proceedings, were conducted outside Southeast Asia, were in a language other than English, or were not available in full-text form. A summary of the criteria is presented in Table 1.

Table 1: Inclusion and exclusion criteria.

Domain	Inclusion criteria	Exclusion criteria
Population	Local poultry, native chicken, indigenous chicken, village poultry, backyard poultry	Industrial scale commercial poultry
Phenomenon of Interest	Economic, social, or environmental sustainability	Does not assess sustainability indicators
Context	Southeast Asia	Regions outside Southeast Asia
Study design	Primary research studies	Review, editorial, proceedings, book chapter
Language	English	Languages other than English
Availability	Full text available	Full text not available

Table 2: Final search string per database.

Database	Search string
Scopus	("local poultry" OR "indigenous chicken" OR "native chicken" OR "village poultry" OR "backyard poultry" OR "family poultry" OR "free-range poultry") AND ("sustainability" OR "sustainable development" OR "resilience" OR "livelihood" OR "sustainable farming") AND ("economic" OR "social" OR "environmental" OR "triple bottom line") AND (Indonesia OR "Southeast Asia" OR "Thailand" OR "Vietnam" OR "Philippines" OR "Malaysia" OR "Myanmar" OR "Cambodia" OR "Laos")
Web of Science	("local poultry" OR "indigenous chicken" OR "native chicken" OR "village poultry" OR "backyard poultry" OR "family poultry" OR "free-range poultry") AND ("sustainability" OR "sustainable development" OR "resilience" OR "livelihood" OR "sustainable farming") AND ("economic" OR "social" OR "environmental" OR "triple bottom line") AND (Indonesia OR "Southeast Asia" OR "Thailand" OR "Vietnam" OR "Philippines" OR "Malaysia" OR "Myanmar" OR "Cambodia" OR "Laos")
Science Direct	("local poultry" OR "native chicken") AND ("sustainability" OR "sustainable farming") AND ("economic" OR "social" OR "environmental" OR "triple bottom line") AND ("Southeast Asia")

INFORMATION SOURCES AND SEARCH STRATEGIES

A literature search was conducted in three major academic databases: Scopus, Web of Science, and ScienceDirect, as they have extensive and relevant international publication coverage. The search was conducted on November 19, 2025, using a combination of keywords related to local poultry, sustainability, and the Southeast Asian region. The full search string was used in Scopus and Web of Science, while a simplified search string was used in ScienceDirect due to technical limitations on query length. The final search string is shown in Table 2.

This review restricted its search to Scopus, Web of Science, and Science Direct because these databases provide comprehensive coverage of peer-reviewed international journals with established indexing standards and transparent retrieval procedures. The selection of these databases was intended to ensure methodological rigor, quality assurance, and reproducibility of the review process. Although agricultural or regional databases and grey literature may include additional studies relevant to local poultry systems, limiting the search to peer-reviewed sources is consistent with the objective of this Triple Bottom Line-based systematic review. Instead, it ensures a consistent synthesis of empirical evidence assessing economic, social, and environmental sustainability dimensions within a comparable and internationally recognized scientific framework.

STUDY SELECTION PROCESS

Study selection followed the PRISMA 2020 process, which consists of identification, screening, eligibility assessment, and inclusion. The initial search yielded 59 records, comprising 7 from Web of Science, 15 from Scopus, and 37 from ScienceDirect (Figure 1). After removing five duplicate articles, 54 unique articles were screened through title and abstract review. At this stage, 50 articles were excluded for the following reasons: publication date prior to 2016 (n = 12), non-primary literature (encyclopedias and book chapters) (n = 7), review articles (n = 6), proceedings

(n = 2), and studies with irrelevant titles or abstracts (n = 23). Four articles were retained for full-text review; all were successfully accessed and assessed according to the eligibility criteria, resulting in four studies being included in the final synthesis. This limited number of studies reflects the state of the existing literature, where research on the sustainability of local poultry businesses within the TBL framework is still scarce and many studies only assess one aspect of sustainability, thus not meeting the inclusion criteria for this multidimensional review.

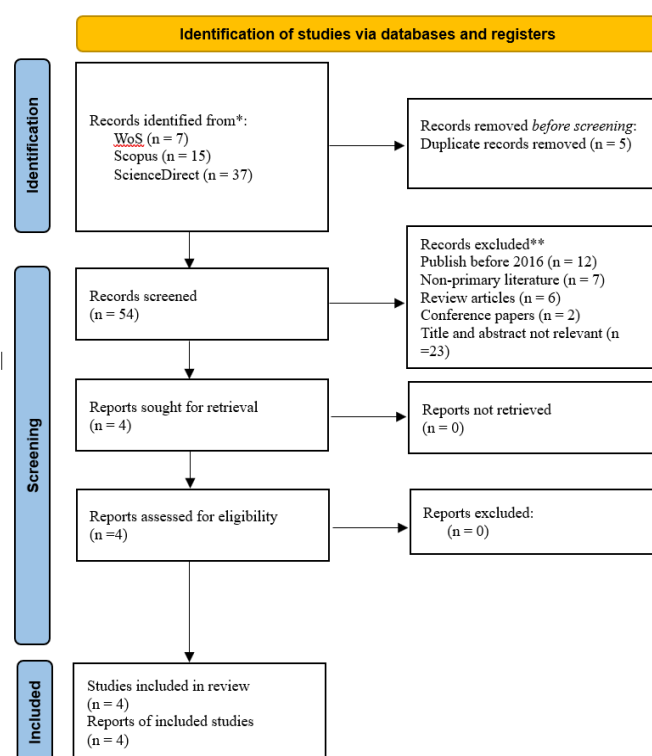


Figure 1: PRISMA 2020 flow diagram of the study selection process.

DATA EXTRACTION

Data extraction was conducted using a structured form to ensure consistency between studies. Information collected included author(s) and year of publication, country, study

design, sample size, data collection method, poultry species, TBL dimensions analyzed, key indicators, analysis method, core findings, contribution to each sustainability dimension, study limitations, and the relevance of the findings to the review objectives.

RISK OF BIAS ASSESSMENT

Methodological quality assessment was performed using the JBI Critical Appraisal Checklist for Analytical Cross-sectional Studies. Each JBI appraisal item was classified as “Yes,” “No,” “Partially,” or “Unclear,” based on the information reported in the articles. A rating of “Partially” was assigned when a study addressed a given criterion but provided insufficient detail, limited justification, or incomplete methodological reporting to fully satisfy the JBI requirement. In contrast, “Unclear” was used when the relevant information was not reported at all or when the description was too vague to allow an informed judgment. These distinctions were applied consistently across all included studies to ensure transparency and comparability in the quality assessment.

The assessment results indicated that all included studies were of moderate methodological quality, primarily due to limitations in identifying and controlling for confounding factors and differences in measurement validity between studies.

DATA SYNTHESIS

The synthesis was conducted using a narrative thematic synthesis approach due to the heterogeneity of research designs, indicators, and analytical approaches, thus avoiding quantitative analysis. This approach grouped findings into three TBL dimensions: economic, social, and environmental, and then analyzed general patterns, variations, and research gaps to provide a comprehensive overview of the sustainability of local poultry businesses in Southeast Asia.

RESULTS

Four studies met the inclusion criteria and were analyzed in this systematic review. All studies were conducted in two Southeast Asian countries, Vietnam and the Philippines, focusing on local poultry businesses, particularly native chickens managed by smallholder farmers. The studies varied in methodological designs, including prospective observational studies, cross-sectional surveys, regression studies, and before-and-after interventions. This diversity of designs reflects different approaches to assessing the sustainability of local poultry businesses, using various economic, social, and environmental indicators. Detailed characteristics of the four studies are presented in Table 3.

Overall, the four studies demonstrated that the economic

dimension was the dominant focus. Two studies evaluated environmental aspects primarily through antimicrobial use, while social aspects were analyzed in depth in only two studies, using agritourism and social factors in circular economy practices. The diverse configuration of the TBL dimensions suggests that research on local poultry in this region tends to emphasize economic sustainability, with limited attention to social and environmental components.

The risk of bias assessment using the JBI Critical Appraisal Checklist is presented in Table 4. All four studies demonstrated moderate methodological quality. Inclusion criteria, study settings, and participant characteristics were well described in all studies. However, the validity and reliability of exposure measurements were assessed as only partially met in three studies and unclear in one. The most prominent limitation arose from the identification and control of confounders; three studies did not specify these, while one only partially identified them. Furthermore, outcomes were measured objectively in two studies, while the other two relied on respondents' subjective assessments. Statistical analyses were generally adequate, although one study only partially met the criteria. Overall, the risk of bias was primarily due to the lack of control for confounders and the reliance on self-reported data.

Thematic synthesis based on the TBL framework showed that the economic dimension was the most consistent finding across all studies. *Truong et al. (2021)* found low profit margins in local chicken businesses in Vietnam, with feed costs being the dominant component, while *Bao et al. (2024)* showed that reducing antimicrobial use can increase net benefits and business efficiency. In the Philippines, *Liangco et al. (2023)* found that agritourism through local chicken contests contributed to increased household income and economic opportunities for communities, while *Liangco et al. (2025)* showed that implementing circular economy practices helped reduce production costs and increase efficiency, while strengthening the economic value of local poultry businesses. The results of the thematic synthesis are presented in Table 5.

Regarding the social dimension, two studies made significant contributions. *Liangco et al. (2023)* showed that agritourism activities strengthen social cohesion and provide cultural benefits to local communities. Meanwhile, *Liangco et al. (2025)* found that social norms, perceived benefits, and farmer motivation play a significant role in the adoption of circular economy practices. Both studies demonstrate that social aspects are a crucial component in supporting the sustainability of local poultry businesses, although empirical evidence is still limited.

The environmental dimension was addressed in three studies. *Truong et al. (2021)* noted the high use of antimicrobials

Table 3: Study characteristics.

Author & year	Title	Country	Poultry type	Study design	Sample size	Data collection method	TBL dimensions studied	Key indicators	Main results	Study limitations
Truong <i>et al.</i> (2021)	Small-scale commercial chicken production: A risky business for farmers in the Mekong Delta of Vietnam	Vietnam	Native chicken	Observational study	102 farms, 203 flocks	Weekly visits, production and antimicrobial use verification	Economic and environmental	Return on Investment (ROI), feed cost, antimicrobial use, mortality, and revenue	Low profit margin, high risk; high antimicrobial use increases costs	No social discussion and high mortality variation
Liangco <i>et al.</i> (2023)	Economic Sustainability Through Agritourism in Rural Communities: The Case of Native Chicken Beauty Contest in Isabela, Philippines	Philippines	Native chicken	Cross-sectional	639 respondents	Structured questionnaire (self-reported)	Economic and social	Income improvement, tourism benefits, and community welfare	Agritourism increases income and social benefits	No instrument validation and perception bias
Liangco <i>et al.</i> (2025)	Tiny Circular Economy Practices in the Cagayan Valley Region, Philippines: A Case Study of Native Chicken Farmers	Philippines	Native chicken	Cross-sectional	400 farmers	Likert-scale and survey validation	Economic, social, and environmental	Waste reuse, feed reuse, and circular economy practice	Circular economy improves cost and environmental efficiency	Self-report bias, limited control variables
Bao <i>et al.</i> (2024)	Economic assessment of an intervention strategy to reduce antimicrobial usage in small-scale chicken farms in Vietnam	Vietnam	Native chicken	Intervention study	102 base-line farms; 39 intervention farms	Weekly monitoring, production and antimicrobial use costing	Economic and environmental	Net benefit, antimicrobial use cost, and cost-benefit analysis	Reducing antimicrobial use increased profitability and efficiency	Not including social factors as control variables

Table 4: Risk of bias assessment.

JBI Criteria	Truong <i>et al.</i> (2021)	Liangco <i>et al.</i> (2023)	Liangco <i>et al.</i> (2025)	Bao <i>et al.</i> (2024)
Inclusion criteria are explained	Yes	Yes	Yes	Yes
Study setting and participants are clearly described	Yes	Yes	Yes	Yes
Exposure measured in a valid and reliable way	Partially	Partially	Partially	Unclear
Outcome measured in a valid and reliable way	Yes	Partially	Yes	Yes
Confounding factors identified	No	No	No	Partially
Strategy for handling confounders	No	No	No	No
Objective outcome	Yes	No	No	Yes
Adequate statistical analysis	Yes	Yes	Yes	Partially
Quality conclusion	Moderate	Moderate	Moderate	Moderate

Table 5: Thematic synthesis based on TBL.

TBL theme	Supporting studies	Key findings	Implications
Economic	Bao <i>et al.</i> (2024); Liangco <i>et al.</i> (2025); and Truong <i>et al.</i> (2021)	Thin profit margins, dominant feed costs, antimicrobial use reduction increases net benefits, agritourism and the circular economy increase income	The most consistent and dominant economic dimension. The importance of policy support for profitability
Social	Liangco <i>et al.</i> (2023) and Liangco <i>et al.</i> (2025)	Agritourism strengthens communities and the circular economy is influenced by social norms and motivations	Social aspects influence the adoption of innovation
Environmental	Bao <i>et al.</i> (2024); Liangco <i>et al.</i> (2025); and Truong <i>et al.</i> (2021)	High antimicrobial use has the potential to increase antimicrobial resistance, reducing it can reduce risk, and a circular economy reduces waste.	Great opportunities to improve sustainability through waste management and reduced antimicrobial use

in local chicken farms and its association with the risk of antimicrobial resistance. Bao *et al.* (2024) found that interventions to reduce antimicrobial use not only increase profits but also have the potential to reduce environmental impacts and health risks. Furthermore, Liangco *et al.* (2025) demonstrated that circular economy practices such as waste utilization and feed reuse can reduce organic waste and improve environmental efficiency. Overall, the environmental dimension remains under-researched, but available evidence suggests significant opportunities for improving sustainability through reduced antimicrobial usage and improved waste management practices.

The combined findings from these three themes indicate that the sustainability of local poultry businesses in Southeast Asia is still dominated by economic considerations, while social and environmental dimensions contribute partially to the impact of antimicrobial usage. These results indicate the need for further research that comprehensively integrates all three dimensions of TBL to develop a more complete picture of sustainability.

DISCUSSION

ECONOMIC DIMENSION

The economic dimension was the most dominant and consistent aspect across all the studies analyzed. Truong *et al.* (2021) reported that local chicken businesses in Vietnam had low profit margins due to high feed costs and antimicrobial use, a finding reinforced by Bao *et al.* (2024) whose intervention to reduce antimicrobial usage successfully increased the business's net benefit. In the Philippines, Liangco *et al.* (2023) found that native chicken-based agritourism opened up new economic opportunities for rural communities, while Liangco *et al.* (2025) demonstrated that implementing a circular economy, such as waste utilization and re-feeding, can reduce production costs and increase efficiency. These consistent findings align with international research showing similar patterns. For example, a study in Nigeria found that the distribution of superior genetically modified poultry significantly

increased the profitability and economic resilience of smallholder farmers during the COVID-19 pandemic (Bamidele *et al.*, 2023). This demonstrates that relatively simple, technology-based interventions can strengthen economic sustainability. Furthermore, agribusiness research in Brazil confirms that the economic dimension remains a top priority in livestock systems, although social and environmental aspects are beginning to be taken into account in sustainability evaluation frameworks (Zanin *et al.*, 2020). These cross-country findings reinforce that profitability and cost efficiency are key foundations for the sustainability of local poultry businesses across global contexts.

SOCIAL DIMENSION

The social dimension emerged primarily in two studies from the Philippines. Liangco *et al.* (2023) demonstrated that local poultry-based agritourism strengthens social cohesion, increases community interaction, and preserves local cultural values. Meanwhile, Liangco *et al.* (2025) emphasized that social norms, perceived benefits, and farmer motivations play a crucial role in the adoption of circular economy practices. While both studies raise important social concerns, neither study in this systematic review evaluated broader social indicators such as gender roles, household dynamics, and institutions. These findings align with comparable studies in Africa. Fuchs *et al.* (2019) demonstrated that community programs integrating agroforestry training and community participation can increase incomes while strengthening farmers' social networks. Bettridge *et al.* (2018) also found that adaptation based on social and environmental contexts is crucial for the sustainability of free-range chicken farming in Ethiopia. Thus, globally, the social dimension plays a strategic role in the sustainability of smallholder farms, although empirical evidence in the Southeast Asian context remains limited.

ENVIRONMENTAL DIMENSION

The environmental dimension is addressed in three studies, particularly regarding antimicrobial use and resource management. Truong *et al.* (2021) highlight the high

level of antimicrobial use and the risk of antimicrobial resistance, while [Bao *et al.* \(2024\)](#) shows that interventions to reduce antimicrobial usage not only improve economic efficiency but also mitigate environmental risks. [Liangco *et al.* \(2025\)](#) add a perspective through circular economy practices, where organic waste utilization and feed reuse can reduce waste and improve environmental efficiency. [Muwakhid *et al.* \(2025\)](#) provide supporting evidence from Indonesia, indicating that the utilization of industrial by-products, such as fish meal oil sludge and cassava dregs, as alternative poultry feed ingredients can improve feed efficiency while simultaneously reducing waste disposal and dependence on conventional feed resources. While these studies make important contributions to antimicrobial usage, they do not evaluate broader ecological indicators such as carbon emissions, energy efficiency, or biodiversity. These findings are consistent with international evidence. [Paul \(2019\)](#) reports that improving feed efficiency in East Africa can reduce greenhouse gas emissions while increasing the productivity of smallholder farmers. This evidence suggests that the environmental dimension of local poultry enterprises requires a more comprehensive and measurable assessment.

INTEGRATION OF THE THREE DIMENSIONS OF TBL

Across the included studies, the social and environmental dimensions of sustainability were assessed using a limited but identifiable set of operational indicators. Social sustainability was primarily captured through indicators such as social capital, farmer networks, community cohesion, cultural values, and farmer motivation influencing participation in agritourism and circular economy practices. Environmental sustainability was mainly assessed using indicators related to antimicrobial use and associated resistance risks, as well as organic waste management practices, including waste reuse and feed recycling. While these indicators provide important insights into non-economic dimensions of sustainability, their application remains fragmented and uneven across studies, limiting comprehensive TBL integration.

A synthesis analysis shows that the literature on the sustainability of local poultry businesses remains fragmented. Only one study, [Liangco *et al.* \(2025\)](#), comprehensively integrates all three dimensions of TBL. The other three studies assessed either two dimensions or only one dimension of sustainability. This suggests that the application of the TBL framework in empirical research on local poultry remains limited, despite its relevance for understanding complex household farming systems. International studies also show a similar pattern. [Arora *et al.* \(2016\)](#) found that the agribusiness sector in Argentina still places the economic dimension as the primary focus, while the integration of social and environmental aspects

is suboptimal. A global review by [Nica *et al.* \(2025\)](#) also shows that the TBL framework is evolving towards a more inclusive approach, particularly regarding the circular economy and climate impacts. This confirms that the gap in TBL integration exists not only in Southeast Asia but also in other regions.

The dominance of the economic dimension identified in this review should also be interpreted with caution. This pattern may partly reflect search-related and publication biases, as economic performance indicators such as profitability, cost efficiency, and income effects are more frequently measured, reported, and published in peer-reviewed journals than social or environmental outcomes. At the same time, the prominence of economic indicators also mirrors the current orientation of sustainability research in smallholder livestock systems, where economic viability is often treated as the primary entry point for sustainability assessment. Consequently, the observed dominance of the economic dimension reflects not only potential biases in the available literature but also prevailing research priorities, which have yet to fully operationalize the integrated Triple Bottom Line framework.

The relatively limited treatment of social and environmental dimensions in the included studies can be attributed to both conceptual and methodological factors. Conceptually, social outcomes such as community cohesion, cultural values, and farmer empowerment are often context-specific and difficult to standardize, which may discourage their systematic inclusion in empirical sustainability assessments. Similarly, environmental impacts in smallholder poultry systems such as antimicrobial externalities and waste-related effects frequently require technical measurements or longitudinal data that are not readily accessible in small-scale farm settings. Methodologically, many of the included studies relied on cross-sectional designs and self-reported indicators, which tend to favor economic variables that are easier to quantify and compare. As a result, social and environmental dimensions are often treated as supplementary considerations rather than fully integrated components of the Triple Bottom Line framework.

It is important to interpret the synthesized findings in light of the methodological quality of the included studies. The reliance on self-reported data, particularly for economic performance and social outcomes, may introduce reporting bias and potentially overestimate perceived benefits. In addition, the limited identification and control of confounding factors restrict the ability to infer causal relationships between sustainability interventions and observed outcomes. Consequently, the patterns identified in this review should be considered indicative rather than conclusive, reflecting emerging empirical tendencies

rather than definitive evidence of integrated sustainability outcomes.

LIMITATIONS OF THE REVIEW

The identification of only four studies meeting the inclusion criteria is, in itself, a significant finding, highlighting the scarcity of research that holistically integrates all three dimensions of the Triple Bottom Line (TBL) in the context of local poultry farming in Southeast Asia. While a broader search including grey literature or non-English publications might have yielded more records, this review prioritized peer-reviewed articles indexed in major databases (Scopus, Web of Science, ScienceDirect) to ensure methodological rigor and quality assurance. Therefore, the limited number of studies should not be viewed merely as a retrieval constraint, but rather as empirical evidence of the fragmentation in the current sustainability literature, where economic, social, and environmental dimensions are rarely examined concurrently.

In addition to the database selection described above, this review did not include agricultural-specific databases such as AGRIS and CAB Abstracts, nor did it incorporate grey literature sources (e.g., theses, technical reports, or non-peer-reviewed publications). Consequently, some locally produced or practice-oriented evidence on smallholder poultry systems in Southeast Asia may not have been included. However, this limitation does not weaken the core objective of the study, which was to synthesize internationally indexed empirical evidence on sustainability using a consistent Triple Bottom Line framework. Instead, the findings reflect the current state of globally visible research, while simultaneously highlighting important gaps for future regionally focused and multidisciplinary studies.

The literature search for this systematic review was conducted on a single date, representing a systematic snapshot of the available evidence at that time. As a result, studies published after the search date were not captured in the review. This temporal limitation may affect the completeness of the evidence base, particularly in a rapidly evolving research area such as sustainability and livestock systems. However, the findings are valid for the defined search period and provide a reliable synthesis of the peer-reviewed literature available at the time of data collection.

In addition, forward and backward citation tracking was not performed as part of the study selection process. As a result, some relevant studies that were not indexed in the selected databases or not retrieved through the predefined search strategy may have been missed. This limitation may affect the completeness of the evidence base; however, it does not compromise the internal consistency of the

review, which was conducted using a transparent, database-driven, and PRISMA-compliant screening process. Future systematic reviews may consider incorporating citation tracking to complement database searches and further enhance coverage.

Sensitivity analysis was not conducted in this review because the synthesis was narrative in nature rather than quantitative. The included studies exhibited substantial heterogeneity in study design, outcome measures, and sustainability indicators, and the number of eligible studies was limited. Under these conditions, sensitivity analysis would not provide meaningful or methodologically appropriate insights. This limitation reflects the characteristics of the available evidence base rather than a methodological shortcoming of the review.

PRACTICAL AND POLICY IMPLICATIONS

Based on the evidence from four empirical studies conducted in Vietnam and the Philippines, this systematic review provides context-specific insights for strengthening local poultry businesses in comparable smallholder settings. Economically, the reviewed studies suggest that interventions such as circular economy practices, income diversification through agritourism, and reductions in antimicrobial use may improve farm efficiency and household income under specific local conditions. Socially, the findings indicate that community empowerment, farmer motivation, and social capital play an important role in supporting the adoption of sustainable practices, although empirical evidence remains limited. Environmentally, the reviewed evidence highlights the importance of improved organic waste management and responsible antimicrobial governance to reduce environmental and public health risks.

These policy-relevant insights should be interpreted as evidence-informed rather than definitive region-wide prescriptions, given the limited geographical coverage and number of included studies. Therefore, the findings are most appropriately used to inform pilot interventions, adaptive policy design, and further empirical testing in similar local poultry systems, rather than as representative recommendations for the entire Southeast Asian region.

Among the various policy-relevant findings identified in this review, antimicrobial governance emerges as the most urgent priority for strengthening the sustainability of local poultry systems. Evidence from Vietnam demonstrates that high antimicrobial use not only increases production costs and business risks but also poses significant public health and environmental threats (Truong *et al.*, 2021). Intervention-based evidence further shows that reducing antimicrobial use can simultaneously improve economic

efficiency and mitigate antimicrobial resistance risks (Bao *et al.*, 2024). Complementary findings from the Philippines indicate that circular economy practices, including waste reuse and improved farm management, can support reduced antimicrobial dependence while maintaining farm viability (Liangco *et al.*, 2025). Taken together, these findings suggest that targeted antimicrobial stewardship policies represent a high-impact, cross-cutting intervention capable of addressing economic, social, and environmental sustainability challenges in local poultry systems.

IMPLICATIONS FOR FUTURE RESEARCH AND POLICY

This review highlights the need for future research that explicitly integrates the three dimensions of the Triple Bottom Line (TBL) within a single methodological and conceptual framework, particularly in smallholder poultry systems similar to those examined in Vietnam and the Philippines. The reviewed studies indicate that while economic outcomes are relatively well documented, social and environmental dimensions remain underexplored and not well operationalized. Therefore, future research should build directly on these empirical gaps by employing multimethod approaches that combine surveys, field observations, and environmental impact assessments to capture multidimensional sustainability outcomes.

Mukherjee *et al.* (2024) emphasize that integrating TBL indicators across sectors is crucial for strengthening social innovation and encouraging technology adoption on smallholder farms. Furthermore, a study in Bangladesh by Shamsuddoha *et al.* (2023) demonstrated that integrating TBL into the dairy supply chain can improve economic performance while strengthening the well-being of local communities. This evidence suggests that the integrative TBL model has significant potential for application to local poultry enterprises in Southeast Asia.

CONCLUSIONS

This systematic review shows that, based on evidence from Vietnam and the Philippines, the sustainability of local poultry businesses in Southeast Asia is still assessed partially and has not yet fully integrated the three dimensions of the Triple Bottom Line (TBL). Of the four studies that met the inclusion criteria, the economic dimension is the most consistently studied aspect, particularly related to profitability, cost efficiency, and the impact of antimicrobial use, as well as innovations such as agritourism and the circular economy. Social and environmental dimensions also emerged, with attention to microbial usage still limited and tending to be a secondary focus. Social aspects are primarily related to community cohesion, cultural values, and farmer motivation, while environmental aspects are more closely linked to antimicrobial use and

waste management. The limited research evaluating all three dimensions of the TBL simultaneously reflects an important research gap that needs to be addressed.

The results of this review emphasize the need for a more comprehensive, multidisciplinary, and integrated research approach to assessing the sustainability of local poultry businesses. Future research should incorporate a wider range of social and environmental indicators and adopt an analytical framework that captures the interrelationships between sustainability dimensions. These findings provide a conceptual and empirical basis for policymakers to design interventions that support increased economic efficiency, strengthened farming communities, and improved environmental management, so that local poultry businesses can develop sustainably in the Southeast Asian region.

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NOVELTY STATEMENT

This study represents one of the first systematic literature reviews to synthesize empirical evidence on the sustainability of local poultry farming in Southeast Asia using the Triple Bottom Line (TBL) framework. Unlike previous studies that generally focus on a single dimension of sustainability, this review simultaneously integrates economic, social, and environmental dimensions to map patterns of findings, indicators used, and remaining research gaps. The study's key novelty lies in identifying the fragmentation of the TBL literature on local poultry businesses and confirming that few studies have truly adopted a multidimensional sustainability approach in the Southeast Asian context.

AUTHORS' CONTRIBUTION

Ahmad Ridwan, Siti Azizah, Anif Mukaromah Wati, Achadiyah Rachmawati, Irfan H. Djunaidi, Priyo Sugeng Winarto, Nanang Febrianto

Ahmad Ridwan: The conceptualization, data curation, methodology, visualization, formal analysis, and writing original draft. Siti Azizah: The data curation, funding acquisition, investigation, supervision, writing review and editing. Anif Mukaromah Wati: The validation and project administration. Achadiyah Rachmawati: The supervision, validation, and writing review and editing. Irfan H. Djunaidi: The validation and project administration. Priyo Sugeng Winarto and Nanang Febrianto: The validation

and writing review and editing.

GENERATIVE AI AND AI-ASSISTED TECHNOLOGY STATEMENT

The authors declare that generative artificial intelligence (AI) tools, including ChatGPT (OpenAI) and QuillBot, were used in a limited capacity to improve grammatical accuracy, linguistic clarity, manuscript quality, and to assist in refining the interpretation of the study's findings. All data analyses, scientific reasoning, interpretations, and final revisions were conducted and fully verified by the authors, who take full responsibility for the integrity and accuracy of the manuscript's content.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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