The Sri Lankan Poultry Feed Industry under Economic Crisis: Structural Vulnerabilities and Strategic Responses

Colombo Economic Journal (CEJ)
Volume 4 Issue 1, June 2026: PP 117- 136
ISSN 2950-7480 (Print)
ISSN 2961-5437 (Online)

Published by Department of Economics, University of Colombo, Sri Lanka
Website: https://arts.cmb.ac.lk/econ/colombo-economic-journal-cej/

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Received: 17 February 2026, **Revised**: 27 May 2026, **Accepted**: 10 June 2026

Abstract

The feed industry is a key component of the animal-based food system, with approximately 91% of compound animal feeds produced in Sri Lanka being used for poultry. There has been a steady increase in poultry feed prices and a significant drop in feed production during the recent macroeconomic crisis (2022–2024). This study investigates the structural dynamics, operational shocks, and firm-level crisis management strategies adopted by feed manufacturers Utilizing a stratified purposive sample of 30 registered commercial manufacturers and a snowball sample of 60 self-mixed producers across major production hubs, the study operationalizes Small Business Crisis Management Theory via an empirical Resilience Continuum matrix. The findings reveal a highly polarized industry response strictly dictated by operational scale and vertical integration. Macroeconomic shocks—principally a 300% spike in domestic maize costs, foreign exchange illiquidity, and an institutional 15% Value Added Tax (VAT) —led to a 25–50% contraction in commercial output, forcing mills to operate significantly below capacity. While 63.34% of commercial mills and 68.33% of self-mixed operations proved highly Vulnerable (experiencing severe margin compression and asset liquidation), a minor tier of large-scale, vertically integrated integrators (3.33%) exhibited High Resilience by internalizing supply chains and altering feed formulation matrices. Ordinary Least Squares (OLS) models confirm that maize and soybean price variances explain over 90% of retail feed price volatility (R^2 0.86, $p < 0.01$). This structural contraction poses a severe risk to independent smallholder livelihoods and national protein security. The study recommends institutionalizing a predictable raw input import framework, scaling contract farming out-grower schemes, and removing fiscal distortions on essential compound feeds.

Keywords: *Poultry feed, Economic crisis, Feed production, Value Added Tax, Resilience continuum*

JEL Codes: Q13 Q18 O13 D22

Introduction

The poultry sector is an important subsector in terms of agricultural growth and improvements in the diets of people. Chicken meat and egg production are likely to play an increasing role in supplying animal protein for human consumption in the country. They are a relatively cheap and affordable source of animal protein (Alemce and Tedelle, 1997, as cited in Zeberga, 2010). Poultry is one of the fastest-growing livestock sub-sectors in Sri Lanka. The poultry sector's contribution to GDP showed a gradual increase until 2019, yet was highly affected by the COVID-19 pandemic and economic crisis in the following years. With the impact of COVID-19 and control-related trade issues in 2020, the poultry industry had to face numerous issues, which caused a slight setback in the production status of the industry which is not fully recovered. The situation deteriorated further during the recent economic crisis due to a severe scarcity of crucial livestock production inputs. By 2022, a notable decline in both chicken meat and egg production became evident. The scale of this downturn is highlighted by a substantial 28.2% reduction in egg production in 2023 compared to pre-crisis levels in 2019. Concurrently, the per capita availability of eggs plunged dramatically from 132.30 eggs per year in 2021 to just 86 eggs per year in 2023 (DAPH, 2024).

A modern broiler chick under local conditions grows to about 1.8 kg body weight in about 35 days, thus having an average weight gain of about 51 g/day (feed conversion ratio of about 1.7-1.8). In the case of layers, a laying rate of about 95% is achieved during the peak production while having an average laying rate of about 80–85% (over 300 eggs per year). Such a high performance can be achieved only under proper feeding management conditions. Because a deficiency in even a single essential nutrient can trigger a significant reduction in avian growth and productivity, poultry diets must be precisely balanced and carefully manufactured. This strict biological requirement can only be sustained by a highly organized feed industry (Premarathne & Samarasinghe, 2020). Crucially, poultry feed constitutes the single largest operational cost component, accounting for 60% to 70% of the total cost of producing eggs and meat ((Dejene, et al., 2014; DAPH, 2024). Consequently, feed quality and availability dictate the health, growth, productivity, and overall financial viability of poultry farming.

Given the industry's heavy reliance on a stable supply chain, safeguarding the animal feed manufacturing sector is paramount to ensuring national nutrition security. However, local feed industries experienced severe negative impacts during the economic crisis, which directly hindered the growth, operations, and performance of the broader poultry sector. The combined pressures of currency depreciation, import

restrictions, and skyrocketing raw material costs disrupted manufacturing capacities, exposing structural vulnerabilities within the domestic feed supply chain.

While literature acknowledges the macroeconomic shocks sustained by the livestock sector, there remains a critical analytical gap regarding how the foundational tier of this value chain—the feed manufacturing industry—navigated these disruptions. Recent studies frequently document broad production declines, yet insufficient empirical attention has been given to the specific operational stresses, raw material supply failures, and institutional bottlenecks faced by local feed millers. Furthermore, the strategic adaptations and crisis management frameworks deployed by these manufacturers to maintain survival amid acute economic instability remain largely unexamined. Understanding these micro-level industry responses is essential for designing resilient agricultural policies. To address this gap, the broad objective of this article is to examine the status, operational effects, and specific crisis management strategies adopted by poultry feed manufacturers in Sri Lanka during the economic crisis. By analyzing these industry dynamics, this study aims to examine the current status of the poultry feed production sector in Sri Lanka and assess the impacts of the economic crisis on commercial feed manufacturers and self-feed producers. It further investigates the crisis management strategies adopted by these stakeholders and identifies the key constraints, challenges, and opportunities affecting poultry feed production, with a view to deriving policy implications for strengthening the sector's resilience and supporting sustainable recovery.

Literature Review

The poultry sector is widely recognized as a crucial subsector for driving agricultural growth and improving human dietary quality, acting as an essential contributor to a household's nutritional intake. Within the animal-based food system, the animal feed industry functions as the critical backward linkage that dictates overall productivity and market stability. Consequently, safeguarding the animal feed manufacturing industry is a vital step in ensuring national food and nutrition security. Because feed is the most dominant input for poultry production—accounting for 50 to 70 percent of total production costs—the availability of low-priced, high-quality feed is paramount if poultry enterprises are to remain competitive and expand to meet the rising demand for animal protein (Velmurugu, 2013; Dejene et al., 2014). Rapid industrial growth historically created new avenues for large-scale private feed millers and raw material importers. However, this advanced, highly intensive setup renders the sector highly vulnerable to unexpected macro-environmental crises. A business crisis can be defined as an unexpected event that causes severe stress, requires rapid strategic intervention, and mandates structured operational planning to ensure survival and long-term commercial sustainability (Doern, 2016).

Historically, poultry feed production in Sri Lanka experienced rapid expansion, growing from 363.74 thousand metric tons (mt) in 2012 to a peak of 1,025.93 thousand mt in 2021. At this peak, the domestic industry was structurally organized around approximately 47 registered commercial feed mills completely managed by the private sector (DAPH, 2024). However, the acute national economic crisis that escalated in 2022 severely compromised this operational status. By 2023, commercial feed production dropped to approximately 995,263 mt (representing 85% of total domestic volume), while self-mixed feed producers accounted for the remaining 15% at 170,164 mt (DAPH, 2024).

This severe contraction was driven by critical input shocks. Out of the primary ingredients required for high-quality concentrate feeds, only maize is produced domestically. Local maize cultivation plummeted drastically in 2022, primarily due to the abrupt national policy banning chemical fertilizers and pesticides. Concurrently, the government banned the utilization of rice for animal feed to protect human food security. These local shortages were compounded by severe macroeconomic shocks: sharp depreciation of the Sri Lankan Rupee (LKR), an acute lack of foreign currency, and stringent import restrictions. These factors together crippled raw material importation, triggering an exponential rise in the cost of commercial feed and causing an unprecedented price spike in retail chicken meat and eggs (DAPH, 2023). Because optimal avian biological performance can only be sustained if an organized feed industry delivers tightly balanced, nutrient-rich diets, these disruptions caused severe production setbacks across the entire livestock supply chain (Premarathne & Samarasinghe, 2020).

The challenges observed in Sri Lanka mirror the structural vulnerabilities documented in other developing nations navigating severe foreign exchange and inflationary crises (such as Nigeria and Ghana). While experiencing identical supply chain failures, international poultry manufacturers deployed multi-layered crisis-management models:

When facing severe economic shocks, poultry feed sectors and manufacturers globally adopt a mix of nutritional, modeling, and operational strategies to maintain viability. On a nutritional level, as demonstrated by Azafack et al. (2026) in sub-Saharan poultry sectors, critical shortages in traditional energy sources like maize necessitate concrete operational shifts toward the inclusion of processed alternative inputs, including treated cocoa pod powder, cassava tubers, and sorghum offal. To successfully integrate these alternative resources amid market volatility, advanced international operations have increasingly shifted away from traditional, rigid "least-

cost" linear feed formulation paradigms. Instead, they rely on profit-maximizing bio-economic models that dynamically alter feed formulations based on real-time profit margins relative to live-weight market fluctuations, rather than simply minimizing input expenditure (Pesti & Choct, 2023). Beyond these scientific and formulation adjustments, manufacturers in crisis-affected regions also implement structural changes; these include aggressive labor-cost rationalization and micro-level overhead reductions as immediate buffers against soaring ingredient prices, deliberately prioritizing short-term financial liquidity over capacity expansion (Doern, 2016; Smallbone et al., 2012; Wang, 2022).

Methodology

Conceptual and Theoretical Framework: To systematically analyze the dynamics of the poultry feed sector under extreme macroeconomic stress, this study integrates Small Business Crisis Management Theory (Doern, 2016) with foundational Supply Chain Disruption Frameworks. This integrated approach posits that when an exogenous shock disrupts an industry, a firm's operational outcome is dictated by the dynamic interplay between its exposure to the crisis environment, its structural vulnerability, and its strategic adaptive capacity.

As outlined below, the framework links three interconnected dimensions:

1. The Crisis Environment: Characterized by systemic macroeconomic shocks such as unprecedented local currency depreciation, severe foreign currency shortages, erratic agricultural policy shifts (e.g., synthetic input bans), and parallel import constraints.
2. Firm-Level Vulnerability and Responses: Represents the micro-level internal and external stresses experienced by manufacturers (financial and non-financial overhead strains) and the subsequent strategic adaptations they deploy—such as adjustments to value creation models, structural cost rationalization, or shifting toward alternative feed formulations.
3. Sectoral Outcomes (The Resilience Continuum): The ultimate performance state achieved by the firm, modeled as a matrix cross-referencing perceived recessionary impact against realized growth metrics, classifying firms into distinct operational positions: *Highly Resilient*, *Resilient*, or *Vulnerable*.

The study purposively focused on the primary administrative hubs of poultry feed production in Sri Lanka, stratifying the target population into two main categories: registered commercial manufacturers and unregistered self-mixed producers. To guarantee sample representativeness across the commercial sector, a two-pronged

sampling approach was employed utilizing active registry data from the Department of Animal Production and Health (DAPH, 2024).

First, for the formal commercial tiers, a stratified purposive sampling technique was applied directly to the active DAPH institutional database, with sample sizes within each tier allocated proportionately to its overall population weight. These commercial operations were categorized into three distinct strata based on institutional production capacity guidelines: large-scale manufacturers (processing greater than 10,000 t/month, where a census approach was taken to sample all two active enterprises within the total population (N=2, n=2); medium-scale manufacturers (processing 5,000-10,000mt/month), yielding a sample of six enterprises from a total population of 8 (N=8, n=6); and small-scale manufacturers (processing less than 5,000mt/month), resulting in a sample of 22 enterprises from an institutional population of 37 (N=37, n=22). Geographically, these 30 sampled commercial manufacturers are clustered across the Kurunegala, Gampaha, Puttalam, and Colombo districts, where the vast majority of Sri Lanka's industrial processing infrastructure is located.

Second, to capture localized, less formal operations, unregistered self-mixed feed operations were studied exclusively within the Kurunegala district, which represents the highest geographical density of self-mixed producers in the country. Because an official sampling frame for unregistered operations is non-existent (N.A.), high-density Veterinary Surgeon (VS) divisions were purposively selected based on DAPH density records. Within these high-density nodes, a snowball sampling technique was deployed to trace and recruit 10 active poultry operations per division across six major VS divisions: Wariapola, Kobbeigane, Dummalasuriya, Kuliyapitiya, Bingiriya, and Pannala. This cluster-based approach yielded a localized sample size of 60 self-mixed farms, bringing a total aggregated study sample to 90 respondents.

To capture the precise micro-level adjustments and operational transformations caused by this national macroeconomic downturn, the study explicitly demarcated two separate analytical reference periods. The first is the pre-crisis period, defined as the calendar year 2019, which serves as a baseline representing the steady-state, pre-pandemic economic conditions of the poultry sector. This is contrasted against the post-crisis period, spanning 2023 to 2024, which serves as the present assessment window to capture the immediate aftermath of the acute economic crisis, input blockades, and hyper-inflationary supply shocks. By comparing these distinct timeframes, the study isolates the structural shifts forced upon both commercial and self-feed producers by the macroeconomic shock.

Primary data collection was executed using institutional Key Informant Interview (KII) guidelines and pre-coded, structured field questionnaires. KIIs were conducted with senior officers from the Department of Animal Production and Health (DAPH), executive committee members of the All-Island Poultry Association (AIPA), and macro-level raw material importers. Secondary data streams were compiled via a structured review of published trade ledgers, custom clearance sheets, and statistical bulletins from the Department of Census and Statistics and Sri Lanka Customs.

The study assessed operational variables across three primary thematic areas: crisis effects, business performance, and adaptive responses.

1. Experience of Crisis-Related Effects: Measured using multi-item Likert scales, these effects were split into financial and non-financial dimensions. Financial metrics included bank overdraft availability, supplier credit compression, and bad debt accumulation. Non-financial metrics assessed raw material price volatility, ingredient shortages, energy cost surges, and logistics bottlenecks.

Scale Direction: These variables were measured on a five-point Likert scale (1 = 'Strong positive effect' to 5 = 'Strong negative effect'). This ascending order ensures that higher numerical scores correspond directly to greater degrees of operational crisis stress.

2. Adaptation and Crisis Management Strategies: Formulated to capture business model mutations and short-term survival tactics. Business model changes were Dummy-coded (1 = strategy adopted, 0 = not adopted) to identify shifts in the value chain. Tactical adjustments (e.g., utilizing personal savings or liquidating family assets) were evaluated on a five-point Likert scale. Owner experience was treated as a continuous quantitative variable representing the number of years in operation.

3. To evaluate firm performance, this study operationalized a 2×2 performance matrix by cross-referencing two primary categorical dimensions. The first dimension, representing Perceived Impact, utilizes a binary variable to indicate whether a firm was actively affected by the economic crisis (1) or remained unaffected (0). The second dimension captures the firm's Perceived Growth Trajectory through a longitudinal evaluation of total sales volume and net profit margins between the pre-crisis baseline (2019) and the post-crisis assessment period (2023–2024). To operationalize "Growth" into a definitive binary outcome, a strict coding protocol was applied: only firms that reported either "Higher" or "Significantly higher" metrics across *both* sales volume and net profit margins simultaneously were coded as 1 (Growth), while all other performance combinations were coded as 0 (non-growth).

Table 1: Firms Classification Resilience Matrix

Realized Perceived Growth Trajectory	Affected by Economic Crisis: YES (Coded 1)	Affected by Economic Crisis: NO (Coded 0)
Growth Documented (Coded 1)	Highly Resilient	Resilient
No Growth Documented (Coded 0)	Vulnerable	*Excluded from Analysis*

Source: Adapted from Deakins et al. (2012)

Results and Discussion

The institutional structure of animal feed production in Sri Lanka is dualistic, operating across an organized commercial sector and an unorganized informal sector. The organized subsector comprises highly commercialized feed mills and large-scale poultry integrators. At the time of this assessment, this subsector included 45 registered commercial feed mills managed by private-sector enterprises. These registered operations are stratified by active production capacities: large-scale operations processing above 10,000 metric tons (mt) per month, medium-scale mills producing between 5,000 and 10,000 mt per month, and small-scale operations producing under 5,000 mt per month. While large-scale manufacturers utilize automated machinery with internal laboratories to monitor chemical compositions, the unorganized sector consists of unregistered small-to-medium factories and self-mixed operations set up by individual livestock farmers.

In terms of market share, registered commercial mills accounted for 85 percent of national feed output, while self-mixed operations produced the remaining 15 percent. Crucially, poultry feed accounts for approximately 91 percent of total commercial compound feed production, highlighting how closely the livestock economy is linked to the performance of this single subsector. Quality assurance practices reveal a sharp divide between these sectors: while 100 percent of commercial mills use continuous ingredient monitoring, 63 percent of self-mixed producers do not prioritize laboratory quality testing, leading to variations in nutrient uniformity during crises.

Feed mills regulate their production schedule according to the demand of poultry farms. Currently all commercial poultry feed mills are operating below their installed capacity mainly due to low demand for the product, which could be due to increased price of factory mixed compound feeds because of value added tax charges, shortage of ingredients and inconsistent supply of electricity. Large-scale commercial feed producers utilized only 25-40% of the total installed capacity in 2022 and 2023.

Evaluating how firms experienced the economic crisis requires cross-referencing qualitative Likert data with macro-environmental pressures. In this study, scores are aligned such that a rating of five represents a strong negative operational effect, while a rating of one represents a strong positive operational effect.

The crisis environment impacted the vast majority of operations, disrupting 93 percent of commercial mills and 97 percent of self-mixed producers. However, non-parametric analyses reveal distinct financial and non-financial stress profiles across different operating scales.

Table 2: Perceived Impact of Crisis Dimensions (% of Firms)

Macro-Disruption Dimensions	Commercial Mills (N=30) High Effect (Score 4–5)	Self-Mixed Farms (N=60) High Effect (Score 4–5)
Financial-Related Variables		
Supplier Credit Compression	25%	52%
Loan Availability / Overdraft Limits	23%	62%
Bad Debt Accumulation	25%	20%
Institutional Loan Interest Rates	56%	48%
Non-Financial-Related Variables		
Raw Material Hyper-Inflation	100%	87%
Ingredient Stock Shortages	100%	90%
Systemic Energy Price Surges	96%	92%
Currency Depreciation / Forex Access	93%	87%
Rolling Grid Disruptions / Fuel Scarcity	91%	87%

Source: Compiled by the author based on empirical survey data (2023–2024)

These metrics highlight how financial vulnerability depends on the scale of operation. Small, unregistered self-mixed operations experienced severe financial stress due to supplier credit contraction (52%) and limited access to bank loans (62%), making them highly vulnerable to sudden cash flow constraints. In contrast, commercial mills were insulated from immediate supplier credit constraints due to larger capital reserves. Instead, their primary financial strain came from high institutional interest rates (56%), which increased the cost of carrying corporate debt. This severe shift confirms that under high environmental dynamism, executive strategic risk perceptions and adaptive management horizons change rapidly, as traditional

operational baselines fail to yield sustainable manufacturing performance (Garg et al., 2003).

Non-financial shocks affected all scales nearly equally. Raw material cost increases and severe ingredient shortages impacted 100 percent of commercial millers and over 87 percent of self-mixed operations. This shows that macro-level bottlenecks affected the entire supply chain, regardless of a firm's individual scale.

The extensive disruptions across the poultry feed sector stemmed directly from macro-level shocks that compromised input availability. Sri Lanka's structural dependence on imported inputs meant that rapid local currency depreciation and foreign exchange shortages directly restricted imports of essential feed components. This included soybean meal, synthetic amino acids, vitamins, and therapeutic premixes, all of which lack domestic production alternatives.

These import constraints were compounded by local agricultural policy changes, particularly the sudden 2021 ban on synthetic fertilizers and pesticides. This intervention caused an immediate 40 percent drop in domestic maize yields, which disrupted the primary local energy component used in poultry feeds. To protect human food security, the government simultaneously banned the use of rice and rice by-products in animal feed. This policy created an acute supply deficit by removing the primary domestic substitute for maize.

As a result, feed mills faced severe capacity underutilization. Large-scale commercial operations reported operating at just 25 to 40 percent of their installed capacity during 2022 and 2023. This inefficiency was driven by falling demand for commercial compound feed, rising value-added tax (VAT) expenses, and frequent power cuts that disrupted continuous automated production lines.

As illustrated in Figure 1, both commercial and self-mixed poultry feed production is declining. It also clearly demonstrates the precipitous drop in self-mixed feed production after 2019.

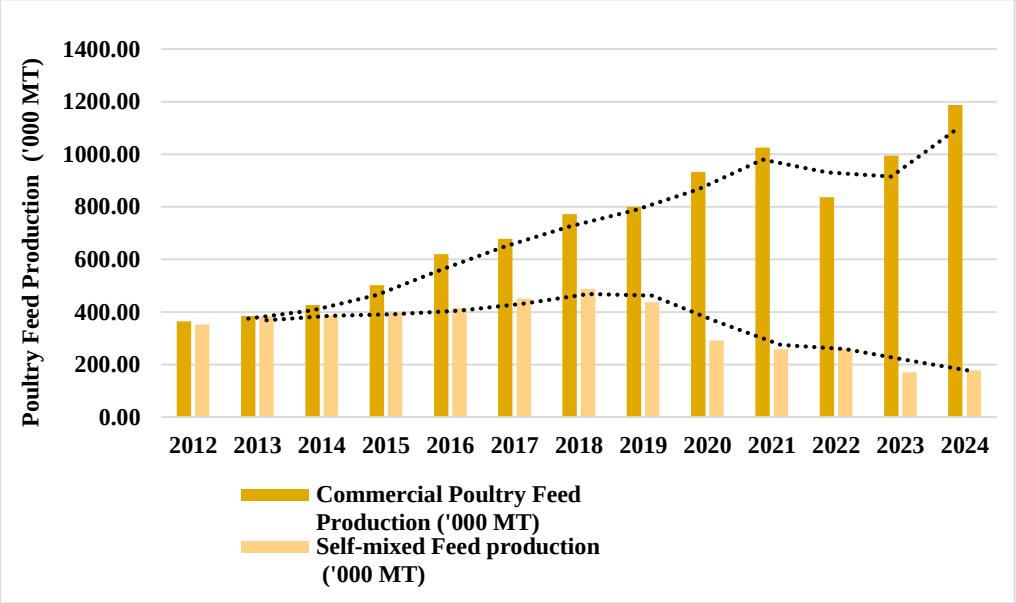

Figure 1: Commercial and Self-Mixed Feed Production

Source: Livestock Statistical Bulletins (2012-2024), DAPH

The combination of ingredient scarcities and import constraints led to a rapid increase in the cost of production (COP) for feed millers. By the 2022–2023 crisis period, the average COP for both commercial layer and broiler feeds had risen by 300 to 400 percent compared to the 2019 baseline.

Table 3: Cost of Production Breakdown per Unit Baseline (2023–2024)

Feed Cost Components	Commercial Layer Feed (Grower) LKR	Commercial Broiler Feed (Finisher) LKR
Raw Material Input Cost	**8,657.30 (89%)**	**9,836.30 (87%)**
Sub-Component: Maize Input	2,593.00	2,325.00
Sub-Component: Soybean Meal (SBM)	2,069.25	2,937.50
Industrial Packaging Costs (5%)	483.55	690.00
Factory Overhead & Labor Operations	530.15	750.00
Total Net Cost of Production	**9,671.00**	**11,276.30**
Applied Value Added Tax (15% VAT)	1,450.00	1,691.00
Final Ex-Mill Retail Selling Price	**11,122.00**	**13,910.00**

Source: Compiled by the author based on empirical survey data (2023–2024)

An addition of a 15% Value Added Tax (VAT) specifically on commercial poultry feed further increased retail prices. This tax increased the final ex-mill price of layer feed to LKR 11,122.00 and broiler feed to LKR 13,910.00. This policy effectively functioned as an indirect tax on domestic protein consumption, passing higher costs down to the final consumers of meat and eggs.

Raw materials emerged as the dominant cost driver, accounting for 89 percent of layer feed costs and 87 percent of broiler feed costs. This hyper-inflation was driven by the country's two primary feed ingredients: maize and soybean meal. Between 2019 and 2022, the price of domestic maize rose by 300 percent, increasing from an average baseline of LKR 55.50/kg in 2019.

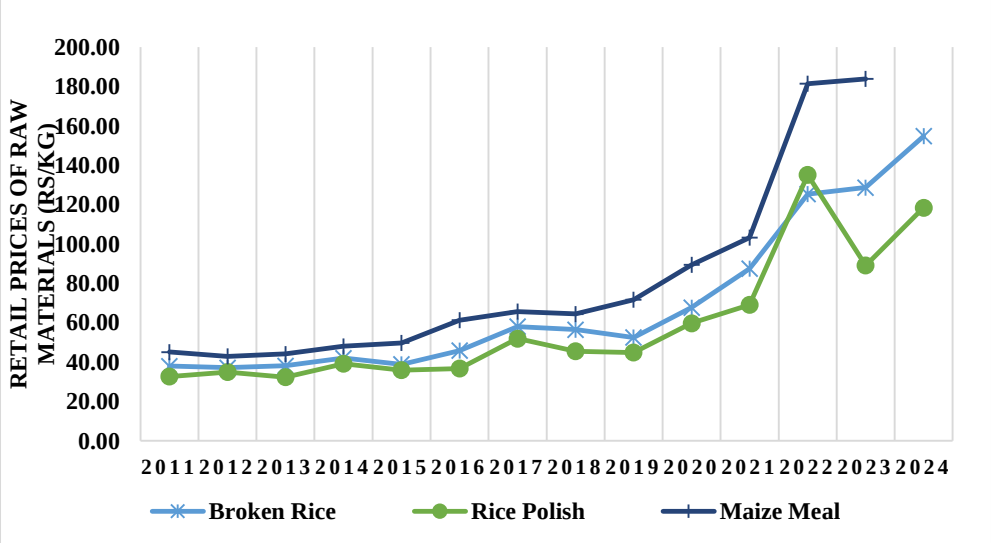

Figure 2: Changes in Prices of Energy Source Raw materials used in Poultry Feed Industry

Source: DAPH (2011-2024)

According to Figure 2, the highest price increment was reported for maize in 2022. The average maize prize was Rs.55.50/kg in 2019. In comparison to 2019, maize prices have increased by 56%, 307%, and 188% in 2021, 2022, and 2023, respectively. Due to limitation of maize supply the demand for broken rice also increased. Considering the broken rice prices, the highest price increment was reported in the year 2022 and it was a 260% price increment compared to 2019.

Table 4: Significance of Maize Prices to Different Poultry Feeds

Variable	Correlation Coefficient (r)	Coefficient of Determination (R^2)
Broiler Starter	0.954**	0.911
Broiler Finisher	0.953**	0.908
Layer Starter	0.966**	0.934
Layer Grower	0.973**	0.946
Layer	0.979**	0.958

*Note: **Correlation is significant at the 0.01 level (2-tailed)*
Source: Vidanapathirana, et al., 2024; Wijesinghe, et al., 2024

Table 5 presents the correlation and regression coefficients evaluating the relationship between maize prices and the prices of various poultry feeds (calculated per kilogram of feed produced). The results indicate a highly significant, strong positive linear relationship across all feed categories ($p < 0.01$). Specifically, variations in the price of maize account for 91.1% of the variance in Broiler Starter prices, 90.8% in Broiler Finisher, 93.4% in Layer Starter, 94.6% in Layer Grower, and 95.8% in Layer feed.

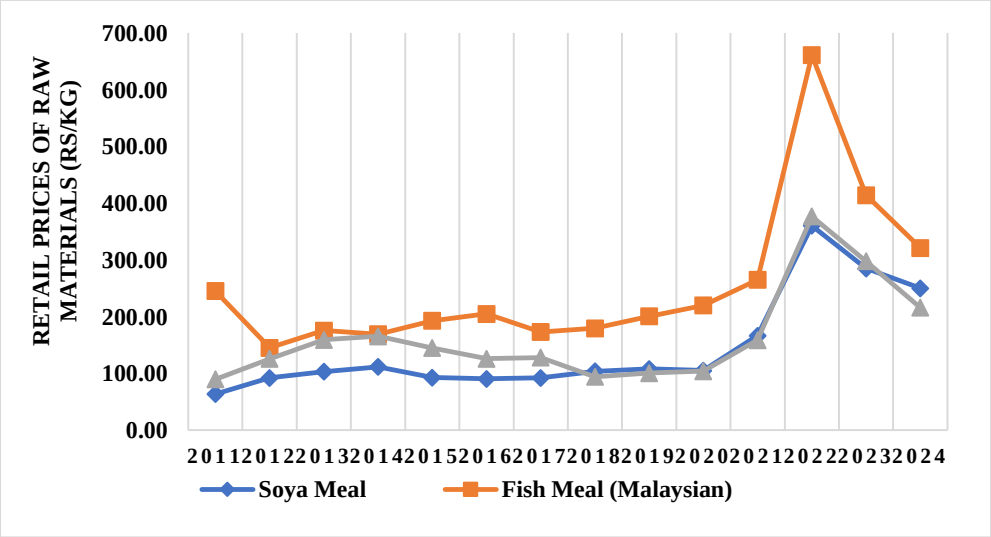

Figure 3: Changes in Prices of Protein Source Raw materials used in Poultry Feed Industry

Source: DAPH (2011-2024)

Soybean meal is the dominant protein supplement used in poultry diets and is the standard to which alternative protein sources are compared. Soybeans can be fed to poultry whole or as soybean meal, a by-product of oil extraction. Because of the

relatively good amino acid profile, it is usually used to balance the dietary amino acid levels with cereal grains and their byproducts in poultry feeds. The price of soybeans, a major ingredient used for poultry feeds, has almost quadrupled in the last year when compared to 2019.

Table 5: Significance of Soybean Prices to Different Poultry Feeds

Variable	Correlation Coefficient	Coefficient of Determination (R^2)
Broiler Starter	0.934**	.873
Broiler finisher	0.932**	.868
Layer starter	0.945**	.892
Layer grower	0.780**	.922
Layer	0.959**	.920

*Note: **Correlation is significant at the 0.01 level (2-tailed)*
Source: Vidanapathirana, et al., 2024; Wijesinghe, et al., 2024

Table 5 illustrates the correlation and regression coefficients between soybean prices and the prices of various poultry feeds per kilogram. Similar to the trends observed with maize, there is a highly significant, strong positive linear relationship across all feed categories ($p < 0.01$). The regression analysis reveals that variations in soybean prices account for 87.3% of the variance in Broiler Starter prices, 86.8% in Broiler Finisher, 89.2% in Layer Starter, 92.2% in Layer Grower, and 92.0% in Layer feed.

To survive these financial and supply disruptions, manufacturers deployed scale-dependent adaptive strategies to protect short-term liquidity and maintain operations.

Table 6: Adoption Frequency of Crisis Management Strategies

	Implemented Coping Tactics	Commercial Millers* (N=30)	Self-Mixed Producers* (N=60)
1.	Alternative Raw Inputs	24 (80%)	40 (67%)
2.	Total Feed Volume Reductions	10 (33%)	12 (20%)
3.	Labor Optimization and Overhead Rationalization	2 (7%)	8 (13%)
4.	Personnel Downsizing	5 (17%)	15 (25%)
5.	Mandatory Flock Liquidations	0 (0%)	10 (17%)
6.	Employee Training	3 (10%)	0 (0%)
7.	Technology Infrastructure	2 (7%)	2 (3%)

*Note: *Frequency/Percentages*
Source: Compiled by the author based on empirical survey data (2023–2024)

The most common strategy was modifying feed formulations, adopted by 80% of commercial millers and 67 percent of self-mixed operations. Manufacturers adjusted their formulations by reducing conventional maize content from its standard 40–60% level down to 20–25%. They substituted this energy gap using lower-cost alternative raw materials, such as broken rice, rejected rice, and wheat flour, while adjusting protein balances where possible.

However, these rapid changes in feed composition had biological consequences for livestock. Sudden adjustments in nutrient density frequently caused birds to go off feed, leading to slower broiler growth and drop-offs in layer egg production. For self-mixed operations, the lack of synthetic carotenoid supplements also caused noticeable changes in egg yolk color, reducing the market value of their products.

Operational restructuring strategies varied significantly by scale. Small-scale self-mixed producers relied heavily on cost-cutting measures: 25 percent downsized their labor force, and 17 percent were forced into partial flock liquidations to maintain immediate cash liquidity. In contrast, large-scale commercial operators focused on asset protection and structural integration. Major poultry integrators expanded their internal feed-mixing capacities to supply their own corporate layer and broiler divisions. This shift toward complete vertical integration allowed large firms to avoid commercial retail markups and insulate their own production systems from supply chain failures.

Theoretical Categorization: The Resilience Continuum

To evaluate long-term impacts of these strategies, firms were classified using a theoretical resilience framework that cross-references crisis exposure against realized performance metrics.

Table 7: Empirical Firm Classification Matrix

Industry Performance State	Impacted by Economic Crisis: YES	Impacted by Economic Crisis: NO
Positive Growth Trajectory	**Highly Resilient** Commercial: 3.33% (n=1) Self-Mixed: 0.00% (n=0)	**Resilient** *Zero empirical cases documented*
Negative/Stagnant Trajectory	**Vulnerable** Commercial:63.34% (n=19) Self-Mixed: 68.33% (n=41)	*Excluded from Analysis Framework*

Source: Compiled by the authors based on empirical survey data (2023–2024)

This classification reveals a stark structural polarization across the industry. Approximately 63.34 percent of commercial mills and 68.33 percent of self-mixed producers fell into the Vulnerable category, reporting significant declines in sales volumes and profit margins. This widespread vulnerability confirms that short-term coping strategies—such as feed ration changes and labor reductions—were insufficient to overcome hyper-inflationary input costs and falling consumer demand. In contrast, the Highly Resilient classification was achieved by just 3.33 percent (n=1) of the commercial sector, and was completely absent among self-mixed producers. This highly resilient profile was unique to large-scale, vertically integrated operations that possessed the capital infrastructure needed to secure raw inputs directly, process alternative feed allocations efficiently, and bypass commercial distribution markups. This distribution shows that long-term survival under severe macroeconomic stress depends directly on a firm's operational scale and structural integration. Small-scale and unintegrated operations lack the resource buffers required to adapt successfully, leaving them highly exposed to market disruptions.

Constraints and Challenges in the Poultry Feed Sector

The operational environment of the poultry feed industry during the macroeconomic crisis was characterized by severe structural bottlenecks. Rather than experiencing isolated disruptions, manufacturers faced a compounding matrix of macro-environmental and micro-level constraints that varied considerably depending on their scale of operation. The primary constraint crippling the animal feed manufacturing sector was the acute shortage of foreign exchange reserves paired with the rapid depreciation of the Sri Lankan Rupee (LKR). Because the industry relies heavily on international markets for over 70–80% of its micro-ingredients and protein bases, the inability to establish Letters of Credit (LCs) severely disrupted import timelines. Large- and medium-scale commercial millers, who operate under continuous capital-intensive production schedules, faced unprecedented bottlenecks in securing vital raw inputs such as soybean meal, synthetic amino acids (methionine and lysine), vitamins, and mineral premixes. This lack of foreign currency forced millers to source ingredients through ad-hoc gray market channels or open account systems, dramatically escalating procurement costs and resulting in severe raw material stock shortages at factory gates.

This import crisis was further intensified by domestic policy interventions that disrupted the production of alternative local feed inputs. The sudden 2021 national restriction on synthetic fertilizers and crop protection chemicals caused an immediate 40% contraction in the domestic maize harvest, which serves as the foundational energy component in poultry rations. This local scarcity drove intense market competition, pushing domestic maize prices up by over 300% from the 2019 baseline.

To protect human food security amidst general food inflation, the government simultaneously imposed a strict ban on utilizing rice or rice by-products for animal feed. This policy intervention effectively blocked the primary domestic substitute for maize, trapping feed manufacturers between unviable international import lines and restricted local crop pools. Furthermore, the introduction of a 15% Value Added Tax (VAT) specifically targeting commercial feed compounders acted as an institutional bottleneck, directly increasing the ex-mill cost of production and reducing the financial viability of commercial compound feeds for smallholder farmers.

On an operational level, the industry was severely hampered by systemic energy shortages, continuous rolling power grid outages, and acute fuel scarcities during the height of the crisis. Feed manufacturing—particularly the automated pelleting, conditioning, and extrusion processes used by large-scale commercial mills—requires an uninterrupted supply of electricity to maintain precise heat treatments and nutrient uniformity. The reliance on industrial diesel generators to maintain operations amid daily power grid disruptions drove up factory overhead costs due to soaring fuel prices. For small-scale, unregistered self-mixed operations, the fuel crisis paralyzed local transport networks, making it difficult to collect raw ingredients from regional distribution depots and deliver finished feed allocations to farms.

As raw material prices increased, firms experienced severe cash flow compression and a parallel tightening of commercial credit lines. Supplier credit setups, which traditionally allowed small-to-medium enterprises (SMEs) and self-mixed producers to operate on flexible 30-to-60-day payment cycles, were abruptly suspended by raw material importers demanding upfront cash transactions. This credit constriction was aggravated by high institutional bank lending rates, which limited access to commercial loans and bank overdraft facilities. Small-scale self-mixed producers lacked the capital reserves needed to absorb these simultaneous upfront cash demands and high interest rates, leading to severe operational capital deficits.

These financial and logistical vulnerabilities were further worsened by institutional gaps, as technical services, research, and extension support aimed at promoting the commercial feed sector remain poorly operated or non-existent. Specifically, there is a critical lack of institutional backing for the utilization of alternative feeds in compound rations, innovative import substitution models for locally produced feed supplements, and infrastructure development support for feed processing machinery. This systemic lack of extension services limits on-farm testing and the promotion of compound feeds, while leaving manufacturers without necessary technical support for feed safety and quality regulation. Consequently, the sector suffers from widespread feed quality issues, where the adulteration of feed with lower-quality

materials has become a common cost-cutting practice. Millers frequently utilize ingredients that should otherwise be rejected on quality grounds due to an absolute lack of access to accredited nutrition laboratories capable of performing quality assurance and residue analysis. For self-mixed feed manufacturers, this structural deficiency, compounded by poor storage management, led to frequent and severe deterioration of feed quality at the farm level.

Conclusion

This study examined the poultry feed sector in Sri Lanka under intense macroeconomic stress through the lens of Small Business Crisis Management Theory and Supply Chain Disruption Frameworks. The empirical evidence demonstrates that exogenous shocks—driven by foreign exchange shortages, currency depreciation, and domestic policy interventions—transformed a previously expanding sector into a highly polarized and vulnerable value chain. Application of the Resilience Continuum confirms that adaptive capacity was strictly scale-dependent. The vast majority of both commercial millers and unregistered self-mixed operations proved highly vulnerable, suffering severe capacity underutilization, capital deficits, and unprecedented cost hikes. Conversely, resilience was confined to a small tier of large-scale, vertically integrated manufacturers capable of leveraging capital reserves to secure direct raw materials, bypass retail markups, and reformulate rations using alternative local ingredients.

Ultimately, short-term, unguided coping mechanisms like arbitrary ration modifications or aggressive labor downscaling are insufficient to withstand systemic economic crises. Without targeted institutional policy interventions to stabilize macro-ingredient availability and formalize supply lines, the poultry feed sector faces persistent structural contraction. This vulnerability not only threatens independent smallholder livelihoods but also directly compromises national food and nutrition security by reducing the availability of affordable animal proteins.

To strengthen the resilience and long-term sustainability of Sri Lanka's poultry feed sector, a coordinated strategy spanning production, trade, and institutional support is urgently required. First, the state must prioritize domestic feed ingredient production and import stabilization. This can be achieved by expanding local maize and soybean cultivation—particularly during the *Yala* season—through the provision of quality seeds, concessional credit, and formalizing out-grower contract farming schemes to guarantee stable markets. Concurrently, because the industry remains dependent on imported soybean meal, the government must establish a predictable, transparent

import policy framework to eliminate the supply shocks and price volatility caused by sudden regulatory or tariff changes.

Second, institutional frameworks must accelerate alternative feed adoption and standardize quality assurance. Public-private partnerships among research institutions, universities, and commercial millers should be incentivized to evaluate the economic feasibility and safe inclusion thresholds of local, non-conventional feed resources (NCFRs). Crucially, to bridge the massive quality disparities between large-scale millers and informal self-mixed operations, the state must expand access to affordable, accredited feed testing laboratories and rollout technical extension programs covering storage management and nutrient uniformities.

Finally, targeted interventions are vital to enhance financial liquidity and regulatory competitiveness. Given that small-scale and self-mixed producers are highly vulnerable to upfront cash demands, dedicated financial mechanisms—such as concessionary working capital facilities and technology-upgrading grants—must be introduced. These financial lifelines should be supported by a business-friendly, rationalized taxation framework (including a reassessment of the feed-specific VAT) to reduce ex-mill production costs, ensure a level playing field across all operational scales, and ultimately secure national nutrition security through affordable livestock protein.

Acknowledgments: The authors express their sincere gratitude to all research respondents and key informants for their invaluable cooperation and support during the fieldwork of this study. Special thanks are also extended to the Editorial Board of the *Colombo Economic Journal* and the anonymous reviewers for their constructive comments and guidance throughout the peer-review process, which significantly enhanced the quality of this manuscript.

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