

ECONOMIC SUSTAINABILITY AS A PREDICTOR OF CONSUMER PURCHASING BEHAVIOUR FOR POULTRY IN TERENGGANU, MALAYSIA

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Abstract: This paper investigates how economic sustainability, framed as a formative second order construct composed of Economic Viability, Supply Chain Resilience and Technological Integration, affects consumer purchasing behaviour in Terengganu, Malaysia. The study aims to address the gap in literature by integrating Economic Viability, Supply Chain Resilience and Technological Integration determinants on consumer purchasing behaviour, while assessing their relative contributions to economic sustainability construct and evaluating its predictive power. The study implements a cross-sectional survey and Partial Least Squares Structural Equation Modelling approach with 354 respondents. Results show that Technological Integration has the largest formative weight to economic sustainability. The composite economic sustainability strongly predicts purchasing behaviour with 61.8 percent of the variance. The findings suggest that visible technological investments and strengthening the supply chain resiliency will further increase the purchasing behaviour and therefore, increase the demand for poultry products.

Keywords: Economic Sustainability, Purchasing Behaviour, Poultry Industry

1. Introduction

In Malaysia, the poultry industry plays a significant position among the population, fulfilling over 90 percent of national demand through domestic production. Malaysia's population consumes 1.8 million chickens daily, making poultry a critical and affordable protein source. Chicken meat has become the staple of daily needs across Malaysia's various ethnicities and cultures. Sustainability is becoming increasingly important because it requires strategies to strengthen the survival and continuity of the poultry industry. Sustainable poultry farming is commonly viewed through the Triple Bottom Line (TBL) theory where it integrates three sustainability dimensions such as economic, environmental and social sustainability. Within the TBL framework, the economic dimension is regarded as the basic requirement to achieve broader sustainability goals within the industry especially in developing countries (Nogueira et al., 2023). This tendency arises because the economic dimension contributes to poverty reduction, job opportunities and food security. Recent studies within agricultural field also reports challenges to implement environmentally oriented practices due to limited access to finance and weak market incentives (Eliseu et al., 2024; Sithole and Olorunfemi, 2024).

The economic sustainability of the poultry industry is affected by several factors such as production costs, market demand and technological advancements. In terms of the cost,

animal feed contributes the highest portion of the expenses, as much as more than 70 percent of the total costs in broiler farming (Benalywa et al., 2019). Hence, the aim should be to enhance the profitability and sustainability of the poultry industry. Recently, the industry has increasingly adopted contract farming and vertical integration. According to Harianto et al. (2019) and Mohammad Nor et al. (2024), these strategies prove that they can improve the production efficiency and market access.

While economic strategies such as contract farming and vertical integration display production benefits, external factors still have the capabilities to affect the poultry supply chain. Although the COVID-19 pandemic has subsided, consumers have learned that such a situation can disrupt the supply of poultry products. The food supply chain had flaws that made it difficult for the industry to guarantee that consumers would receive poultry products in a dependable manner. The industry needs to implement strategies that are dependable enough to anticipate, plan for, and adjust in the event of unforeseen disruptions in order to increase resilience. Recent initiatives have sought to address these three dimensions to strengthen the supply chain resilience. Advanced technologies and the development of dynamic capabilities are being developed for this purpose (Tian et al., 2022).

Beyond economic strategies and supply chain challenges, technological integration also plays an important role in ensuring the industry's sustainability. The implementation of digital devices and automated systems in poultry farming, including real-time monitoring and improved tracking systems, can significantly enhance efficiency and product quality (Ahmed et al., 2021;). The sentiment is also supported by Sidarto and Hamka (2021), as the use of technology can further enhance the transparency and traceability across the food supply chain, addressing consumer concerns regarding food safety and authenticity. These technologies can reduce the unnecessary steps, minimise delays and improve coordination among the stakeholders in the poultry industry. In addition, these implementations have positive impacts on public purchasing behaviour as they build trust and reinforce perceptions of product quality accessible in the market. More importantly, the innovations in poultry farming help in building trust among consumers. While public awareness on these innovations may be limited, its indirect benefits in shaping consumer preferences and perceptions remain significant. Prior research has examined the factors that influence consumers' decisions to buy organic meats and poultry, including price sensitivity, familiarity, brand trust, and health consciousness (Leong, 2021).

The majority of these factors ignore more general systemic issues in favour of concentrating on individual attitudes or preferences. Specifically, there is a lack of research investigating the combined effects of Economic Viability, Supply Chain Resilience and Technological Integration on public purchasing behaviour, which creates a gap in understanding on how these structural elements affect consumer decision making. Existing research mostly focuses on urban regions such as Klang Valley or certain kind of products such as halal and organic meats, overlooking less-studied non-urban areas that face distinct economic and logistical challenges (Hernandez-Rey et al., 2024; Leong, 2021). Since there is growing importance of poultry as an affordable protein source, there is a need to explore how these structural factors influence consumer purchasing behaviour in area or state such as Terengganu. The regional gap shows potential limitation of supply chain capacity and

economic resilience. This study addresses that gap by examining the integrated impact of economic, supply chain and technological factors on poultry purchasing behaviour, thereby offering new insights for the industry stakeholders and policymakers.

This paper contributes in three ways. First, it extends the literature on the consumer behaviour by conceptualising economic sustainability as a higher-order constructs that integrates Economic Viability, Supply Chain Resilience, and Technological Integration determinants. Second, it contributes methodically by applying PLS-SEM to assess the relative contribution of each sub-dimension and the predictive power of the overall construct. Lastly, it contributes empirically by providing evidence from Terengganu, a non-urban Malaysian context that has received limited attention in previous studies.

2. Literature Review

2.1 *Economic Viability*

Economic viability is crucial in the poultry industry as it ensures the poultry farming retains profitability for the producers, encouraging them to utilise the resources efficiently, be competitive in the market and strong against market fluctuations (Bist et al., 2024). In addition to the producers, retailers and policymakers are paying attention to how the economic factor influences the consumer intention in buying poultry products.

The total cost of poultry production will directly affect the retail prices, which then, will affect the consumer buying decisions. Kleyn and Ciacciariello (2021) stated that the industry itself is viable economically because of its efficiency in producing food products and its ability to meet the rising demand locally and globally due to population growth and the change in socio-economic. However, there is a need to look thoroughly on the viability aspect in the future since it will depend on finding the balance between the supply and demand, which may be limited to the resistance in adapting certain technologies and shifts in changing consumer behaviour and expectations. The study by Ozkan et al. (2023) also supported the previous study by showing that the broiler prices are mainly influenced by the feed costs and other economic factors. Reducing the input costs by either implementing price control mechanisms or stabilising the economy, the price of poultry products can maintain its consistency which would support the economic viability of the poultry industry.

Under the broader economic conditions, disposable income and economic stability have significant influence on consumer intention to buy poultry products. The study in South Togo shows that economic and socio-demographic elements have positive impact on the budget allocated to poultry consumption (Yovo and Lagno, 2021). It also revealed the fact that higher income levels and urban residence are correlated with the increase of the consumption. Similar to the previous study, a study in Zimbabwe that examine consumer preferences for poultry meat also found similar factor of economic, mainly on the price relative to disposable income, which influences the purchasing decisions (Makanyeza and du Toit, 2016). Although the geographic and cultural context of these two studies differ from Terengganu, Malaysia, it shows that the economic factor influences poultry consumption.

These three regions share similar characteristics of developing economies making them highly susceptible to poultry price fluctuations.

Consumers purchasing behaviour changes based on price fluctuations, income levels and affordability of the poultry products. At the same time, the poultry industry also responds strategically to economic pressure by planning their production and marketing approaches. Studies have demonstrated that economic factors directly affect the consumption patterns. For instance, Vinothraj et al. (2020) conclude that household income and affordability are the significant determinants of poultry product consumption. The study was conducted in India which revealed that economic considerations weight heavily on consumer decisions to purchase poultry products over other protein sources. This study strengthens the results of the study by Toluwase and Kolapo (2017). The authors analyse based on economic factors on people who live in rural and urban areas. The result is the rural consumers are more sensitive toward the price compared to the urban counterparts while the income level positively influences the purchasing frequency and quantity. These insights are valuable in the context of Terengganu, Malaysia, suggesting that local economic status, household income and pricing strategies can greatly affect the public purchasing intention.

Taken together, these studies imply that economic viability in poultry consumption among consumers is mostly viewed through price, income and affordability. However, this literature remains focused on immediate consumer-level determinants and does not explain how these economic conditions interact with supply chain and technological factors in shaping purchasing behaviour. This study answers to that limitation by examining economic viability as one dimension of a broader economic sustainability construct in the poultry context.

2.2 Supply Chain Resilience

Supply chain resilience is a critical element in researching the factors that affect consumer purchasing behaviour as a response to various internal and external factors such as pandemics, natural disasters, geopolitical matters and others. SCR refers to the ability of a supply chain to anticipate, prepare, plan ways to respond, and how to recover from disruptions. At the same time, it also strives for continuing the operation and maintain the performance. Researchers have tried to consolidate what is SCR, its enablers and capabilities. It includes flexibility, redundancy, visibility and collaboration (Zara et al., 2025). Stronger supply chain capabilities can absorb the impact of disruptions, adapt to changing situations and recover efficiently. It also ensures the consistent availability of poultry products which can maintain the customer intention to consume poultry products.

The resilience of poultry supply chain has been especially tested during the COVID-19 pandemic. Ferlito (2020) mentions that the pandemic exposed several notable weaknesses in the poultry industry. The industry relies heavily on imported feed ingredients which created problems when international ports were faced lockdown measures thus delaying shipment. These situations had forced local producers to look for alternative suppliers and absorbed the increase of input costs. At the same time, movement restrictions order and health related absenteeism have created labour shortages in farms and packing facilities that significantly

reduced the poultry supply. Supply chain resilience is also a crucial element in maintaining consumer confidence in poultry product.

In addition to previous study, several post pandemic barriers have been identified such as inadequate infrastructure, fragmented stakeholders' coordination and weak risk management measures (Tian et al., 2022). These findings echo similarly with the large number of small producers in Terengganu. The study implies that there is a need to upgrade physical infrastructure and strengthen the coordination between public and private stakeholders to reduce the gaps between farmers, feed suppliers and distributors. Abanigbe et al. (2023) analyse several resilience strategies adopted by smallholder poultry farmers, including collective infrastructure investments, exploring livelihoods and trading opportunities, maintaining productivity at manageable levels and involving in contract farming. In context of Terengganu, cooperatives can enable farmers to pool resources to improve infrastructure and create side incomes. However, these strategies by the authors don't consider the implementation challenges such as amount of investment and government policies.

A study conducted in Yogyakarta introduced the Halal Supply Chain Resilience (HSCRES) index as a measure of supply chain handling disruptions in regards of halal compliance (Kurniawati and Cakravastia, 2023). The study found that logistic providers adopt predictive systems and implement traceability that aligned with halal standards. As a result, the chain recovers more quickly when facing issues with supply chain. Similarly, Terengganu's poultry sector can increase the resilience aspect by adopting same methods to absorb shocks, maintain the halal standard and guarantee confidence among consumers.

These findings show that supply chain resilience is required to maintain continuity and recovering from disruptions. Even so, the literature lean to the aspect of treating resilience as an operation issue within production and logistics, rather than a factor that may shape consumer confidence and purchasing behaviour. This study further that discussion by incorporating supply chain resilience into a higher-order economic sustainability model and testing its relationship with purchasing behaviour.

2.3 Technological Integration

Technological integration is defined as the use of digital tools, platforms and data system strategically to strengthen the operational efficiency, sustainability and decision-making process. According to Kiyani (2023), technological integration is a way of adopting advanced hardware and software to establish innovations that can be used in any industry to achieve long term sustainability. This definition is closely related to the poultry industry where automation and the use of hardware devices and software systems could reduce the losses and improves traceability especially in rural areas of Malaysia. The study also emphasizes on aligning the technological integration with the business strategies since such integration has higher chance of producing meaningful benefits to those who are constrained with sources of investment.

In rural areas, the use of traditional practices is very common even in 2025. Although the development of technology has become widespread and explored, the adoption of

Internet of Things (IoT), artificial intelligence (AI) and software in the poultry industry are still limited mainly due to the high cost of infrastructure. Studies have shown that these technologies enable real-time monitoring, facilitate in farming activities, ensures healthy environment conditions for the livestock (Chaurasia, 2024; K C et al., 2024). These advancements in technologies have proven to be beneficial to the bird welfare and increase the product quality. The assurance of high quality and safe products produced by smallholders in farm will affect the purchase behaviour especially among the people who live in urban areas.

A study from Kopler et al. (2023) shows that farmers' view on precision livestock farming (PLF) that could enhance consistency, welfare and traceability of poultry products. This could potentially increase consumer trust in quality and ethical practices which translate to willingness to buy the products. Although the high upfront cost remains as the biggest concern among farmers, the improvements directly benefit the consumers by ensuring higher meat quality and food safety. However, the knowledge gap regarding the benefits must be filled so that the consumers are aware of the improvements of poultry products are due to the latest technology advancement in poultry farming.

Advanced monitoring and control systems in poultry farming, which combines IoT, environmental regulations and Artificial Intelligence (AI), can optimize several aspects within the poultry industry (George and Hovan George, 2023) such as the welfare of the livestock, establishing standard of product quality and reduce waste produced from the operations. Their findings are also directed toward the benefit of the automated system where it can retain maximum potential for the livestock growth, reduce mortality and managing resources to operate efficiently. In consumer's perspective, safer product and ethical practices can encourage them to spend more income to purchase higher quality and quantity of poultry products.

Overall, the reviewed studies show that technological integration improves traceability, efficiency and product quality. However, the implications of these technologies toward the consumers remain underexplored. In particular, prior studies commonly discuss technology as a production enhancement rather than as part of integrated sustainability structure. Therefore, this study addresses that gap by positioning technological integration as a core component of economic sustainability and examining its contribution to consumer purchasing behaviour.

2.4 Purchasing Behaviour

To understand the purchasing behaviour of consumers, it is crucial to explore the elements that lead to decision making. Purchasing behaviour can be explained by the steps taken which consumers evaluate, decide and act on their intention to buy a product (Isbahi, 2023). The intention is usually influenced by interest, price and perceived quality. Awareness, preferences and motivations will encourage the interest, while price is the topmost important factor especially for low- and middle-income families. In other words, price factor will override product quality whenever it is necessary to afford the consumption.

A study by Ozkan et al. (2023) offers critical insights into factors affecting purchasing intention in the poultry market, which focusing on the area of Bursa, Turkey. They concluded that consumers mainly prioritise freshness, production rate and taste when purchasing it. Factors such as product origin and advertising do not contribute much. The result suggests that consumers purchasing intention are shaped by the quality rather than marketing. In addition, lower- and middle-income respondents lean toward discounted products, showing that economic viability influences the purchase. In the context of Terengganu, consumers are mainly the similar lower- and middle-income earners which coincide with the study.

Another study contributes to the knowledge of purchasing behavior of poultry products indicate that price transparency is the major factor (Minbashrazgah et al., 2017). The findings, specifically on green chicken products, display a clear understanding of price and perceived value of poultry product among customers. The behaviour is not affected by the product quality or branding, but more on how pricing is reflected. As poultry products remain as a staple among people in Terengganu, transparent pricing strategy could be used to change the intention of consumers. If they perceive the pricing as transparent, their trust in product increases and it can lead to the likelihood of purchase.

The study by Vida and Szakály (2023) displayed a comprehensive analysis of consumer behaviour in European poultry market. They identified several factors such as health awareness, convenience in assessing the products, and the origin as factors influencing purchasing decision. As consumers increasingly relate the benefit in health with the consumption of poultry products, it leads to the higher demand of lean meat and processed products. The insights suggest that those who live in urban areas in Malaysia, may have similar priority where they choose more on ready to cook products due to lifestyle changes and time constraints. The authors also noted that European consumers tend to prioritise the origin and food safety certification whereas the consumers in Malaysia place greater focus on religious compliance.

The explanation on how broader structural factors in shaping consumer decisions remain limited even if prior studies identify several determinants at product level. It means the literature still lacks an integrated view that links economic conditions, resilience and technology to purchasing behaviour in a single framework. This study fills the gap by modelling economic sustainability as a compound predictor of consumer purchasing behaviour in Terengganu.

In conclusion, recent literatures on the purchasing behaviour of poultry products are influenced by several factors, including taste, freshness, price transparency, perceived value and health benefits. Although the studies are from different area, such as Europe and Turkey, focus on product quality and transparency in pricing as critical factors, regional differences and culture play major roles in shaping consumer behaviour. Understanding motivations and restrictions faced by consumers in Terengganu is crucial to analyse the behaviour in the local context.

Accordingly, the following hypotheses are proposed:

H1: Economic sustainability has a significant positive effect on consumer purchasing behaviour.

Each dimension is expected to contribute meaningfully to the formation of the higher-order construct. In short, economic viability implies the affordability and financial sustainability of poultry production, supply chain resilience safeguards continuity and reliability in product availability while technological integration enhances efficiency, traceability and product quality. Collectively, these dimensions form the underlying structure of economic sustainability. Thus, the following hypotheses are proposed:

H2: Economic viability contributes significantly to the formation of economic sustainability.

H3: Supply chain resilience contributes significantly to the formation of economic sustainability.

H4: Technological integration contributes significantly to the formation of economic sustainability.

Based on the predicting literatures, this study conceptualises economic sustainability as a higher-order construct affecting consumer behaviour in the poultry industry. Economic sustainability is operationalised through three formative dimensions including economic viability, supply chain resilience and technological integration. The conceptual framework in Figure 1 indicates the three formative dimensions are integrated in unified framework, indicating their combined effort provides comprehensive explanation of purchasing behaviour. Therefore, the economic sustainability is expected to pose a significant positive influence on consumer purchasing behaviour, while each dimension contributes to the formation of the overall construct.

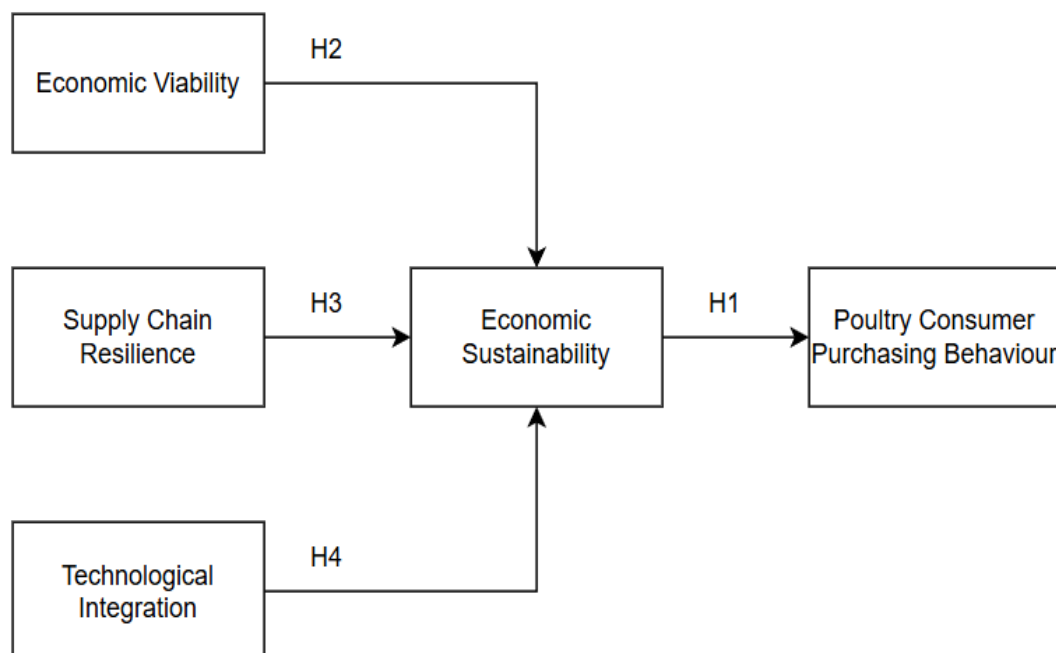


Figure 1: Conceptual Framework

3. Methodology

The researcher chose a quantitative research method to investigate the impact of economic viability, supply chain resilience and technological integration on public purchasing behaviour for poultry products in Terengganu. This method is suitable since it allows systematic measurement and establishing conclusions on purchasing behaviour across populations. In addition, this approach supports the statistical analysis and enables the researcher to find the general conclusion, suitable policies, and recommendations to a higher degree of reliability. On the other hand, a qualitative method may not be able to capture sufficiently the variations in consumer behaviour. Hence, the quantitative method will provide the most valid result to achieve the research objectives. This study utilises a cross-sectional survey design under a deductive framework and uses multivariate modelling to test the relationships between variables. It implements Partial Least Squares Structural Equation Modelling (PLS-SEM).

Data were collected through a structured survey using close-ended questions that can generate data to recognize patterns, correlations and trend. The survey is targeted to those who live in Terengganu state. It utilizes 5-point Likert scales to assess the level of agreement or disagreements with various statements. This guarantees consistency in response in order to facilitate reliable quantitative analysis. To enhance the validity of the analysis, a pilot test was conducted with small group of 30 respondents representing the target population. Feedback received was used to refine the questionnaire in terms of clarity, wording and structure.

The target population for this study is consumers residing in Terengganu who purchase poultry products. The target respondents for this study are consumers residing in Terengganu who purchase poultry product. The sampling method implemented for this study is non-probability sampling, specifically purposive and convenience sampling. Data collection was conducted through online distribution via social media networks such as Facebook, Instagram and X, together with communication channels including WhatsApp and Telegram. The dissemination of the questionnaire was aimed within Terengganu-related groups to ensure the responses obtained were from relevant population. Since the exact number of consumers is unknown, the sample size was determined by using G*Power analysis to ensure adequate statistical power for PLS-SEM (Faul et al., 2009). The minimum required sample size was approximately 77 respondents based on a medium effect size ($f^2 = 0.15$), a significance level of 0.05, and a statistical power of 0.80 (Cohen, 1988). However, to enhance the robustness and generalisability of the findings (Hair et al., 2019), a larger sample size target of 384 respondents was adopted.

This study identified Economic Viability, Supply Chain Resilience, Technological Integration and Purchasing Behaviour determinants as the first order construct while Economic Sustainability was specified as a formative second order construct composed of the three reflective first order constructs (EV, SCR, TI). This modelling choice suggest that the economic sustainability is formed by distinct sub-pillars rather than established by interchangeable indicators. The approach allows direct estimation of formative weights, and it preserves the reflective measurement of the sub-pillars.

4. Result

A total of 413 responses were collected. All respondents were subjected to a standard data screening process before analysis. The criterion for screening includes completeness and response quality. Respondents who display low variance in response quality, which is less than standard deviation of 0.25, were removed because the response patterns are commonly understood as non-differentiation or inattentive response. After screening, 60 respondents were excluded and the final analytic sample of 354 respondents.

The demographic report begins with 56.2 percent of the respondents are male and 43.8 percent are female. 31 percent of the respondents are between 18 to 25 years old, 28.6 percent are between 26 to 35 years old, 19.1 percent are between 36 to 45 years old and 21.3 percent are above 56 years old. For the education background, 18.2 percent of them are SPM holders, 30.5 percent are Diploma holders, 34.4 percent are Bachelor holders, 8.5 percent are Master holders, 4.6 percent are PhD holders and 3.8 percent with no education background. Concerning the profession, 32.9 percent are students, 20.6 percent are working in private sector, 13.6 percent are government employees, 18.2 percent are self-employed, 7.2 percent are retired and 7.5 percent are not working. The summary of the survey demographic information can be referred in Table 1.

Table 1: Survey Demographic Information

Category	Sub-category	N	%
Gender	Male	199	56.2%
	Female	155	43.8%
Age	18 – 25 years old	110	31.0%
	26 – 35 years old	101	28.6%
	36 – 45 years old	68	19.1%
	Above 56 years old*	75	21.3%
Education	No education background	13	3.8%
	SPM	64	18.2%
	Diploma	108	30.5%
	Bachelor's Degree	122	34.4%
	Master's Degree	30	8.5%
	PhD	16	4.6%
Profession	Student	116	32.9%
	Private Sector	73	20.6%
	Government Employee	48	13.6%
	Self-employed	64	18.2%
	Retired	25	7.2%
	Not working	27	7.5%

All indicators for all constructs, Economic Viability (EV), Supply Chain Resilience (SCR), Technological Integration (TI) and Purchasing Behaviour (PB) were included in the initial analysis, but EV2 and SCR2 indicators were removed from formative Economic Sustainability (ES) construct because the value of outer loadings were below 0.60. The Table 2 shows the descriptive analysis for the retained indicators. Based on the 5-point Likert scale, the mean scores for all constructs are close to 4.0, implying the generally positive perceptions and

purchase patterns among respondents in the study area. Standard deviation for EV (0.989), SCR (1.046), TI (0.98) and PB (1.001) suggests moderate dispersion. There is profound variation but no extreme heterogeneity.

All constructs result in negative skewness (-0.913 to -1.125), indicating a trend of responses piling toward the upper end of the scale while kurtosis values are close to zero to moderately positive (0.379 to 1.017), which confirms distributions are not extremely peaked or heavy-tailed. Collectively, the distributional diagnostics agrees that responses lean toward positive evaluations of poultry's economic attributes and correspondingly positive purchasing behaviour.

Table 2: Descriptive Analysis

	Mean	SD	Skewness	Kurtosis
Economic Viability (EV)	3.937	0.989	-1.025	0.872
Supply Chain Resilience (SCR)	3.861	1.046	-0.913	0.379
Technological Integration (TI)	3.972	0.980	-1.025	0.789
Purchasing Behaviour (PB)	3.934	1.001	-1.125	1.017

4.1 Measurement Model

Figure 2 shows the measurement model for this study. The model was analysed to ensure the reliability and validity for both first order (EV, SCR, TI and PB) and the second order formative construct, ES. The results for loadings, Cronbach's alpha, composite reliability and AVE are displayed in Table 3.

For the first order reflective constructs, indicator loadings exceeded or close to 0.7, implying that each indicator sufficiently represents its respective construct. Indicators for EV ranged from 0.705 to 0.734, showing that respondents perceive the profitability, stability and overall economic conditions of poultry products positively. SCR indicators ranged from 0.716 to 0.761, suggesting that respondents acknowledge that the resiliency of poultry supply chain. TI indicators ranged from 0.679 to 0.753, suggesting moderate to high perceived of technology implementation in poultry production. PB indicators ranged from 0.675 to 0.752, implying consistent consumer intention in purchasing poultry products.

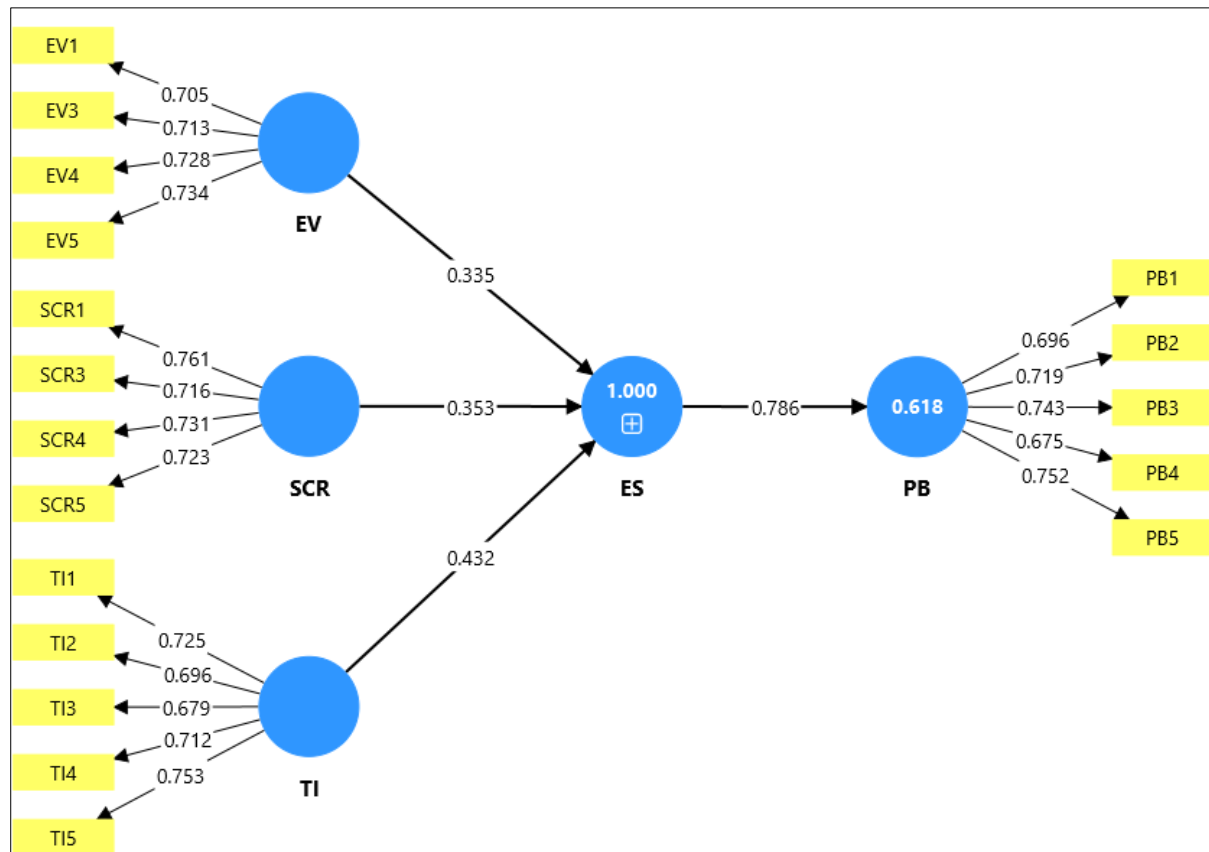


Figure 2: Model Measurement Illustration

The model indicates good internal consistency where composite reliability values for first-order constructs were above 0.8. Cronbach's alpha demonstrated acceptable value where EV is close to 0.7, while the others are above 0.7. The AVE exceeded 0.5 all first-order constructs, proving adequate convergent validity.

The second-order formative construct, ES, composed of EV, SCR and TI, showed high composite reliability of 0.902 and Cronbach's alpha of 0.882. Formative validity was supported by significant outer weights of the first-order constructs and acceptable variance inflation factors, suggesting that ES is sufficiently represented by its sub-pillars. To conclude, these results shows that the measurement model is reliable and valid, and the constructs effectively observe respondent's perceptions of economic sustainability and poultry purchasing behaviour in Terengganu, Malaysia.

Table 3: Model Measurements

Indicator	Loading	Cronbach's alpha	Composite reliability	Average Variance Extracted (AVE)
EV1	0.705	0.690	0.811	0.518
EV3	0.713			
EV4	0.728			
EV5	0.734			
SCR1	0.761	0.713	0.823	0.537
SCR3	0.716			

SCR4	0.731	0.758	0.838	0.509
SCR5	0.723			
TI1	0.725			
TI2	0.696			
TI3	0.679			
TI4	0.712	0.764	0.841	0.515
TI5	0.753			
PB1	0.696			
PB2	0.719			
PB3	0.743			
PB4	0.675			
PB5	0.752			

Note: Economic Viability (EV), Supply Chain Resilience (SCR), Technological Integration (TI), Purchasing Behaviour (PB)

Heterotrait-Monotrait Ratio (HTMT) is a widely used criterion for assessing discriminant validity in PLS-SEM. According to Henseler et al. (2015), the value should be below 0.85 to indicate strict discriminant validity. HTMT of 0.90 may be applied when constructs are conceptually similar. Hair et al. (2020) further support the guideline by suggesting HTMT values below 0.90 indicate acceptable discriminant validity in social science research.

In this study, Table 4 shows HTMT and the confidence interval for each relationship. Several HTMT exceeded the recommended threshold of 0.90, suggesting a high level of correlation among constructs. However, this result is theoretically expected because economic viability, supply chain resilience and technological integration are conceptualised as sub-dimensions of the higher-order construct of economic sustainability. Based on the conceptual proximity, the constructs are inherently related by remain theoretically distinct. Henseler et al. (2015) also recommended that discriminant validity is established when the confidence fall below 1.0, affirming that constructs are empirically distinguishable despite their high correlations. Therefore, discriminant validity is considered acceptable in this study.

Table 4: HTMT Ratio

	Original sample (O)	Sample mean (M)	2.50%	97.50%
PB <-> EV	0.918	0.92	0.842	0.978
SCR <-> EV	0.951	0.955	0.911	0.989
SCR <-> PB	0.936	0.938	0.882	0.981
TI <-> EV	0.949	0.95	0.904	0.992
TI <-> PB	0.872	0.874	0.765	0.978
TI <-> SCR	0.91	0.912	0.839	0.988

Note: Economic Viability (EV), Supply Chain Resilience (SCR), Technological Integration (TI), Purchasing Behaviour (PB)

4.2 Structural Model

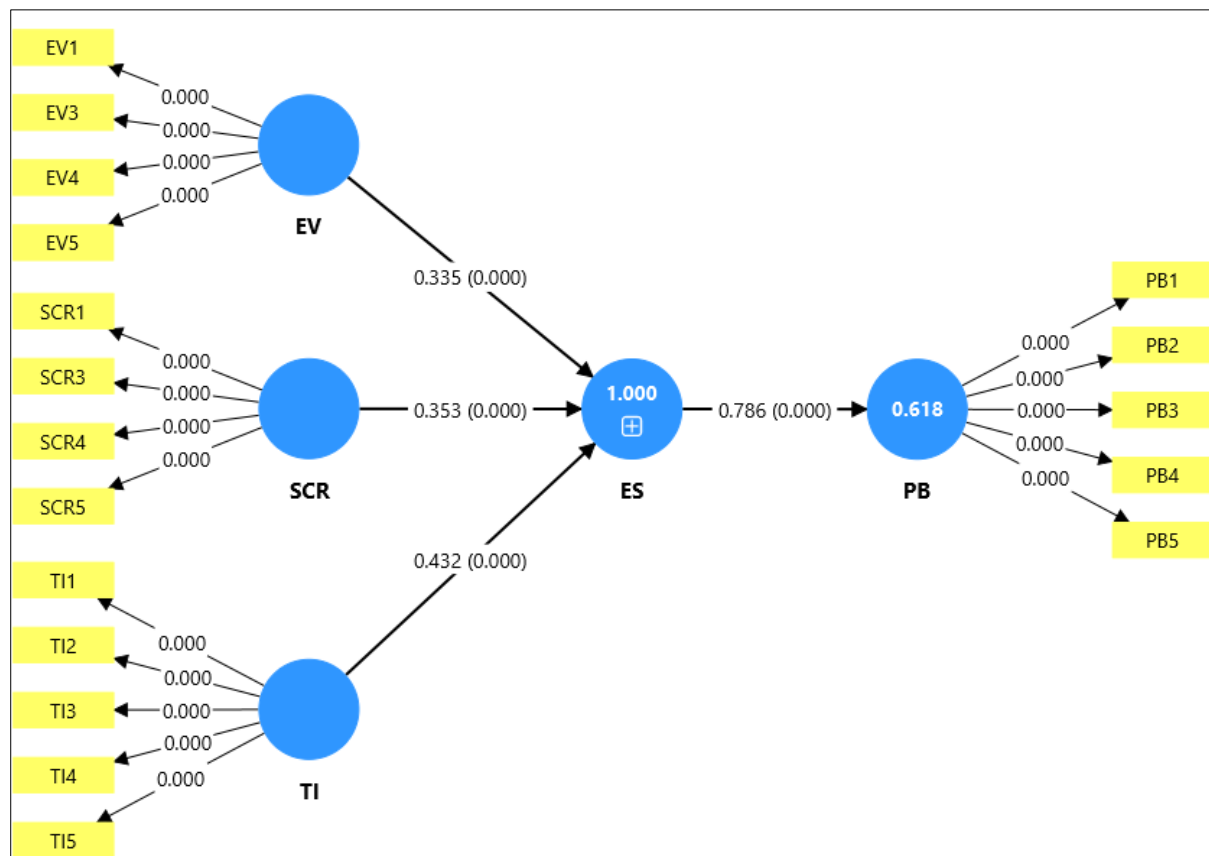


Figure 3: Structural Model Illustration

The structural model showed in Figure 3 was analysed using bootstrapping to test the relationship between the three sub-pillars (EV, SCR and TI) to the composite Economic Sustainability construct, and to the Purchasing Behaviour. Table 5 shows the figures of path coefficients, t-values, p-values and effect sizes.

All structural paths are positive and highly significant. The largest contributor to the formative composite ES construct is TI where the path coefficient value is 0.432, t-value is 4.097 and p-value is 0.000. This followed by SCR where the path coefficient value is 0.353, t-value is 4.576 and p-value is 0.000 and EV where the path coefficient value is 0.335, t-value is 3.297 and p-value is 0.000. These coefficient values imply the respondent's overall valuation of Economic Sustainability and that is contributed strongly by the perceptions of technological adoption in the poultry supply chain, with resilience and economic viability also contributing significantly.

Economic Sustainability strongly predicts consumer Purchasing behaviour (ES $\rightarrow$ PB: $\beta = 0.786$, $t = 39.623$, $p < .001$). The respective f square for ES $\rightarrow$ PB is 1.619, signifies a very large practical effect for a reflective dependent variable. AVE is not calculated for ES because it is a formative higher-order construct. In practical terms, higher perceived economic sustainability in the poultry industry is correlated with higher purchasing behaviour among consumers. The model explanatory power is strong. It is supported by its sub-pillars where r

square value is 1.000. Moreover, the Economic Sustainability explains 61.8 percent of variance in Purchasing Behaviour, suggesting that the composite has considerable predictive relevance in the regional context.

Table 5: Path Analysis

Path	Path Coefficient (β)	t-value	p-value
EV $\rightarrow$ ES	0.335	3.297	0.000
SCR $\rightarrow$ ES	0.353	4.576	0.000
TI $\rightarrow$ ES	0.432	4.097	0.000
ES $\rightarrow$ PB	0.786	39.623	0.000
Construct	R ²	R ² Adjusted	
PB	0.618	0.617	

Note: Economic Viability (EV), Supply Chain Resilience (SCR), Technological Integration (TI), Purchasing Behaviour (PB), Economic Sustainability (ES)

5. Discussion

This study examined how three sub-pillars collectively establish a higher order ES construct and how it predicts poultry purchasing behaviour. By modelling these as a second order formative construct, this study fills the gap identified in the literature regarding the lack of an integrated view linking structural factors to consumer behaviour. Based on the result, the TI sub-pillar is evaluated as the strongest contributor to the formative ES construct (TI $\rightarrow$ ES: $\beta = 0.432$, $p < .001$). Practically, the consumer perceptions on technology use in the poultry value chain, such as traceability systems, farm management, or automation, appear to bring the highest weight when respondents evaluate the industry's economic sustainability. This result strongly supports statements by Kopler et al. (2023) and (George and Hovan George, 2023) which suggest that advanced monitoring and precision livestock monitoring are not tools to support operations but also an important signal of quality and it becomes ethical standards to the consumer. Therefore, the investment toward the visible technologies is most likely to have great effects on public perceptions of sustainability, which will affect the purchase decisions. In this study context, it indicates that the local consumer in Terengganu desire for modernisation as a guarantee of food safety even though traditional practices among poultry producers are still common. Firms also should reflect the investments with improvements to price and availability rather than depending on technological gesturing.

The second highest contributor to ES is SCR (SCR $\rightarrow$ ES: $\beta = 0.353$, $p < .001$). Consumers regard the continuity of poultry's supply chain as important indicator when evaluating if the industry is economically sustainable. Strengthening resilience in the context of poultry industry covers the matter of redundant supply lines, contingency planning for disease outbreak and transportation disruption, will benefits in two ways. The first is it can reduce operational vulnerability and second is it can increase consumer confidence. These findings put empirical weight to Ferlito's (2020) observation that supply chain challenges exposed during the pandemic significantly affect consumer confidence. Plus, as the state of Terengganu faces unique logistical challenges due to monsoon season, a resilient chain ensures that the consistent availability stated by Kurniawati and Cakravastia (2023) is guaranteed, therefore safeguarding the reliability expected and halal integrity expected by local consumers. However, cost-benefit assessment should be implemented to identify best

resilience strategies as the resilience investment can be costly for small and medium poultry producers.

The least contributor among the sub-pillars is EV (EV $\rightarrow$ ES: $\beta = 0.335$, $p < .001$), but it still contributes rather significantly. It does not mean that EV is the least important indicator, but consumers' overall impression of sustainability may vary and lean toward visible technologies rather than economic metrics that are difficult to measure. While price and affordability are important for the lower to middle income earners in Terengganu, these two criteria are viewed as baseline necessity rather than the primary driver of sustainability which affirms the findings by Vinothraj et al. (2020) and Toluwase and Kolapo (2017). To secure producer livelihoods, it is still necessary to increase farm profitability and market stability. Thus, it is crucial to publicise information of economic viability to influence consumer behaviour.

The composite ES strongly predicts PB ($\beta = 0.786$, $p < .001$; $PB R^2 = 0.618$). This confirms that the combined perception of viability, resilience and technology indicates a share of variation in consumer purchasing behaviour. In other words, consumers who perceive the poultry industry as economically sustainable are more likely to purchase poultry products. The result indicates that economic sustainability is a more comprehensive determinant of consumer behaviour in Terengganu than isolated factors such as taste or marketing (Ozkan et al., 2023). Practically, the policy and interventions that strengthen the three sub-pillars and communicated efficiently to consumers will increase the demand of poultry products specifically in Terengganu.

There are three actions recommended to meet the specific needs of industry stakeholders in Terengganu based on the findings of this study. First, the poultry producers are encouraged to prioritise 'visible' technology, including implementing QR-code-based traceability or 'smart farm' labelling, since this information provide a tangible element that justifies purchasing decisions. Second, for supply chain managers and retailers, they should transit from just-in-time to just-in-case resilience strategies. The Terengganu's consumers are prone to seasonal logistical disruptions during the monsoon season, therefore shareholders having redundant local supplies and informing the public out-of-stock mitigation plans to publics helps to strengthen resiliency. Third, government agencies should shift focus from price intervention to incentivising technological adoption strategies. Providing grants or financial loan to smallholder farms will improve poultry sector.

6. Conclusion

The study examined a formative second order ES construct that composed of EV, SCR and TI, and assessed their respective ability to predict purchasing behaviour of consumers in Terengganu. Based on the result and findings, it is concluded that all sub-pillars contribute significantly to the composite, where TI is the strongest contributor and EV is the least contributor. Moreover, ES strongly predicts purchasing behaviour and it explains 61.8 percent of the variance in reported purchases. Thus, the findings suggest that the aggregate perceptions of sustainability are important factor of poultry demand and clear communication and investments in technology will drive the demand even further.

There are several limitations that constrains the interpretation of these results. The study only gathered respondent in one state which limits the causal claim and whether it is applicable to other states in Malaysia. Two indicators, EV2 and SCR2, were removed during measurement refinements because of low loadings, which suggest a need to further refine how economic metrices are communicated to general public. In addition, although the formative construct aligns theory and intercorrelation among sub-pillars, it still requires careful interpretation of relative contributions.

Future researchers may extend the scope of this study to other states in Malaysia or in other regions that has similar tropical weather patterns to analyse the robustness of the supply chain resilience dimension under varying environmental pressures. Researchers also should explore other sub-pillars within economic sustainability and align it with both urban and rural area. Lastly, mixed method studies would enable a better understanding of how economic sustainability affect consumer purchasing behaviour of poultry products.

Acknowledgement

This research was not funded by any grant. All cost was covered by the authors.

Conflict of interest

The authors declare no conflict of interest for this study.

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