ICT-Enabled Food Price Forecasting System for Food Security in the Philippines

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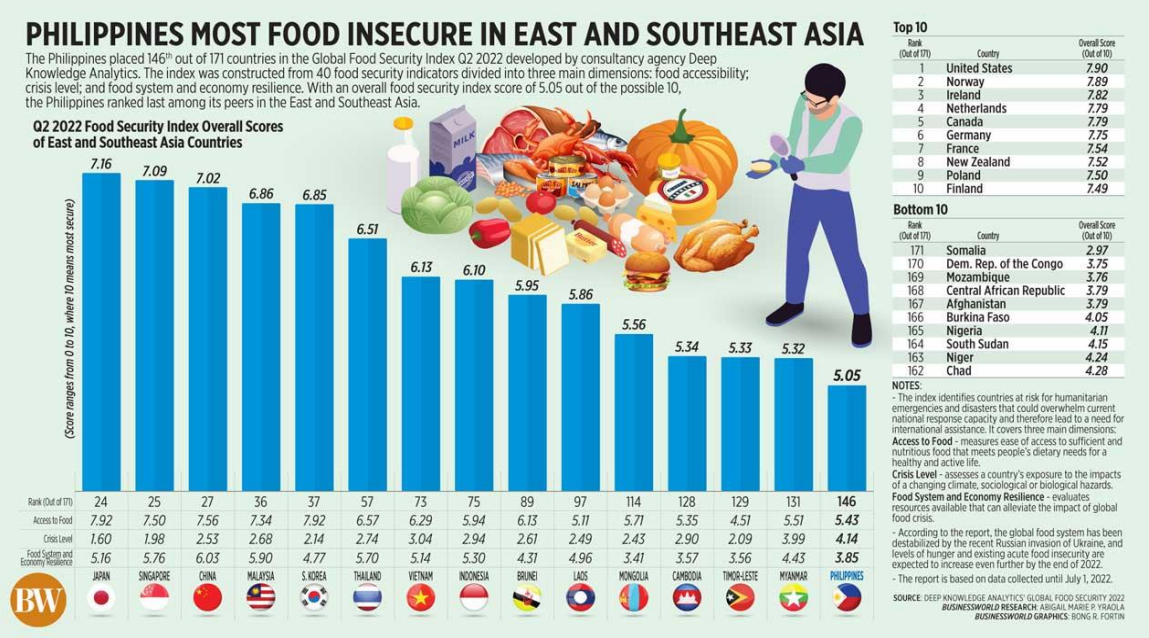
MAPÚA MALAYAN COLLEGES MINDANAO

Project Title: ICT-Enabled Food Price Forecasting System for Food Security in the Philippines

Background :

Food price volatility poses a major threat to food security in the Philippines. (PSA, 2025).



Montano, 2025

Figure 2. Rice Price from September 2010 to April 2024

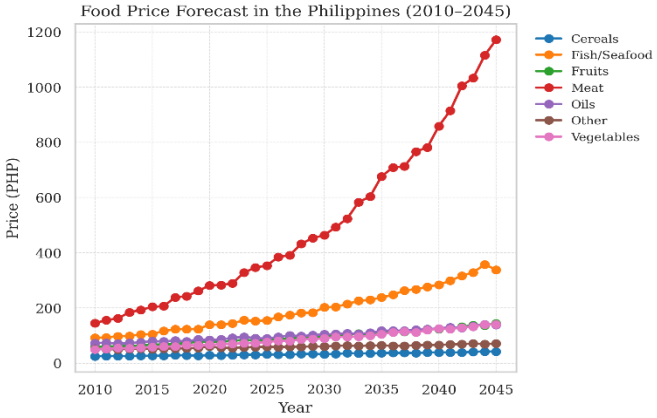
Empirical studies confirm the high volatility of domestic food prices. Montano, 2025 found strong persistence and seasonal effects in price behavior from Oct 1994 to Apr 2024.

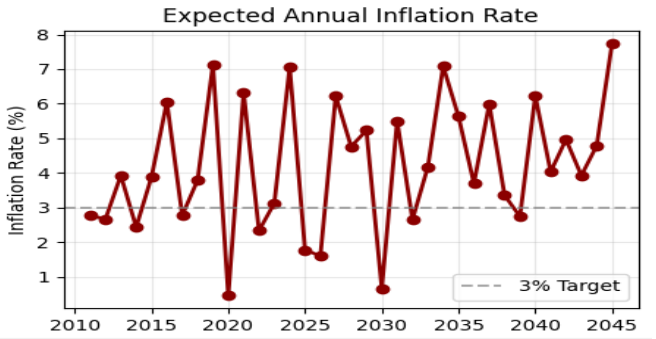
From the demand side, research shows that Filipino households display relatively inelastic demand for rice (income elasticity ~0.26), indicating that consumers cannot easily reduce rice consumption when prices rise—intensifying vulnerability to price shocks(Valera et.al., 2022).

Targets:

- Primary goal: To develop a predictive model capable of forecasting long-term food prices in the Philippines using historical data and machine learning techniques.

- Specific Targets
  - Develop and evaluate predictive models (Random Forest, Gradient Boosting, Linear Regression) for accurate long-term food price forecasting in the Philippines.
  - Analyze regional and categorical drivers of food price fluctuations (commodity type, seasonality, geography) to generate interpretable and policy-relevant insights.
  - Design and implement an ICT-based forecasting platform, integrating machine learning outputs into a user-friendly dashboard for policymakers, farmers, and traders.
  - Facilitate regional knowledge transfer and collaboration, sharing methodologies, datasets, and tools with ASEAN partners to enable adaptation in diverse contexts.





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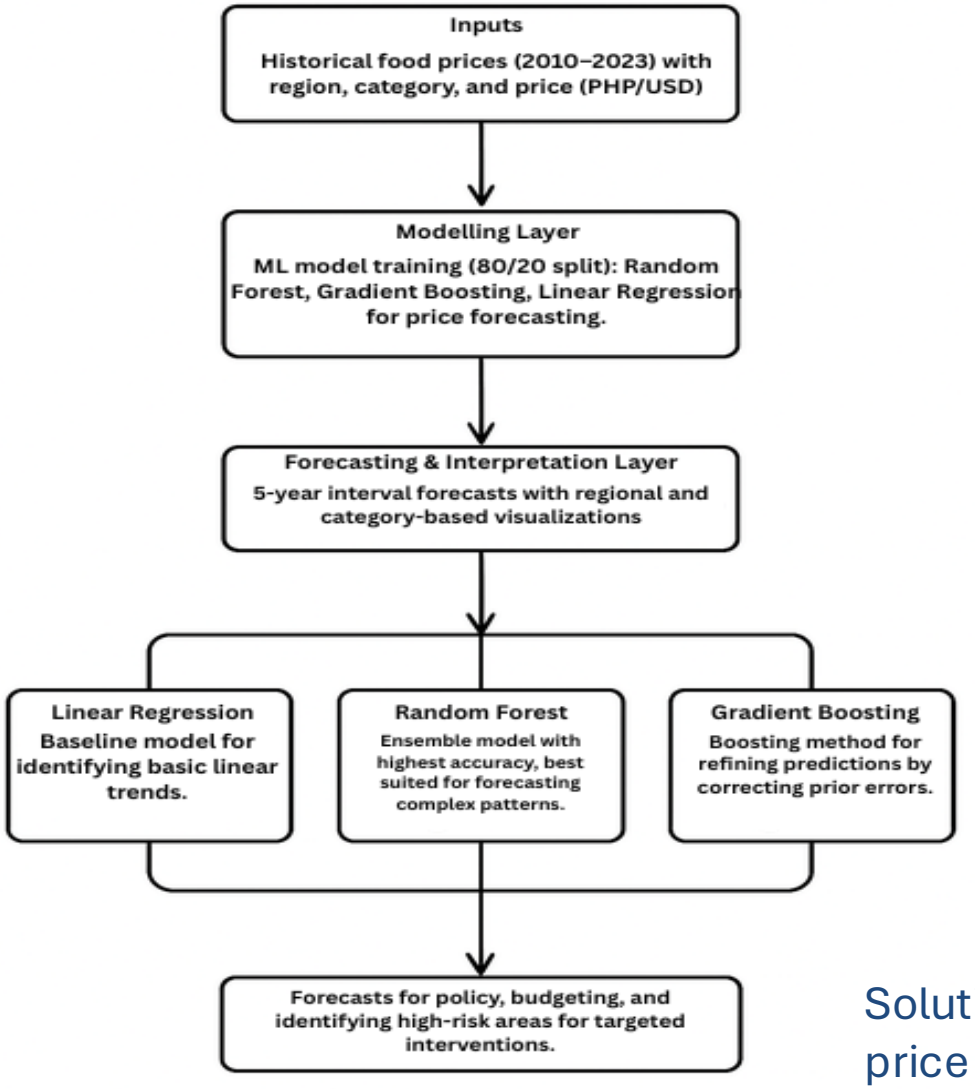
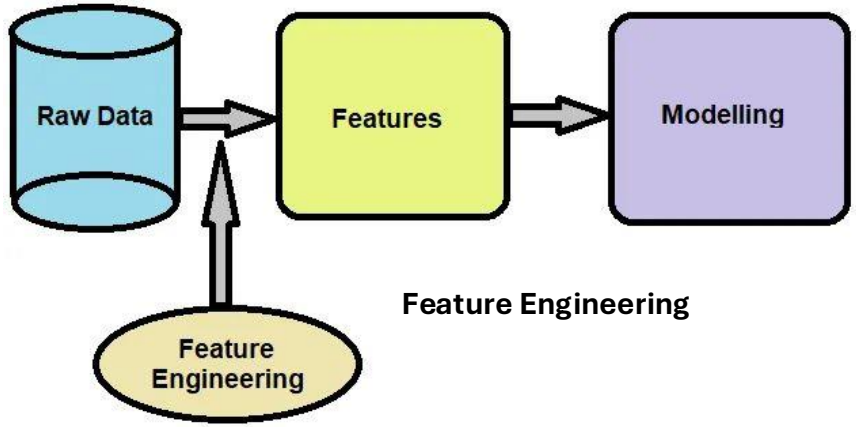


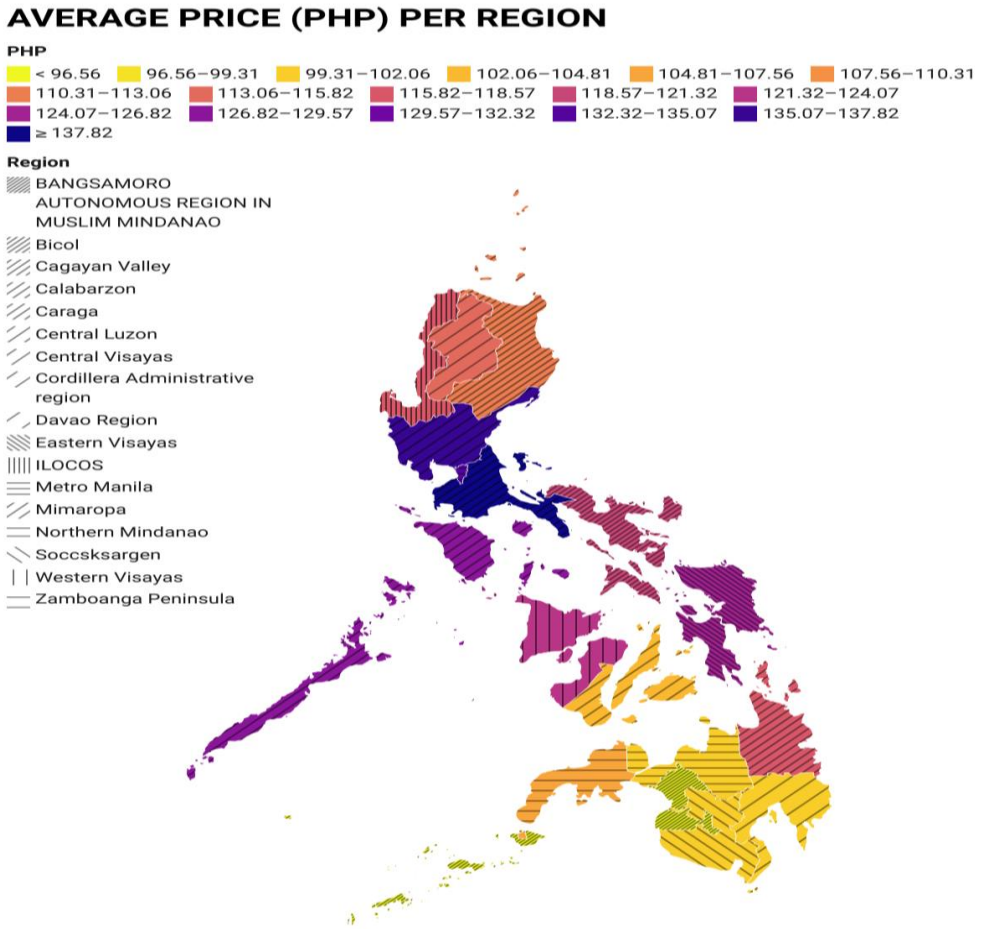
Food Price Forecasting Framework

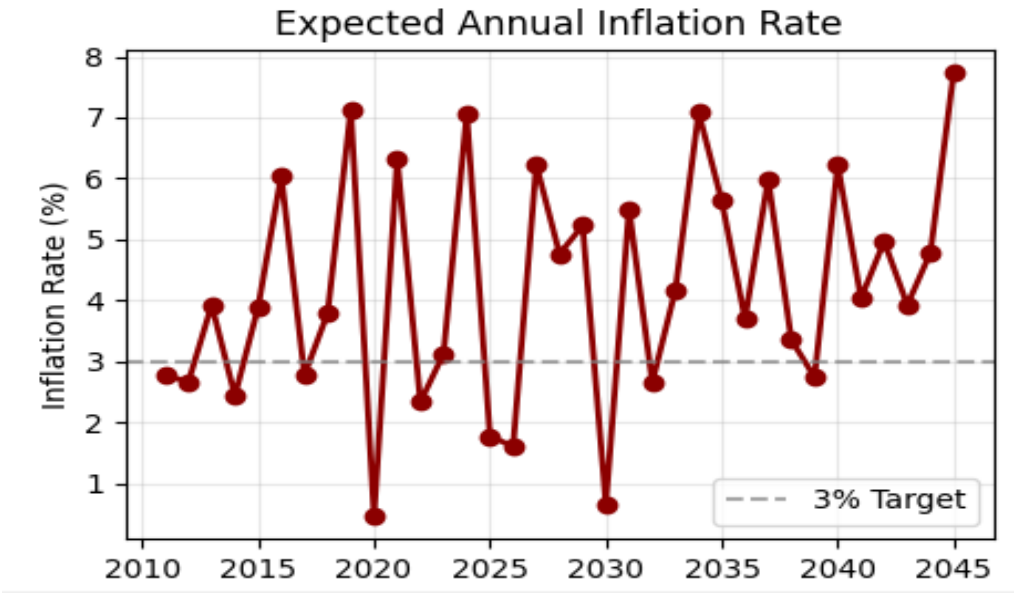


Feature Engineering

Solution 1: Develop and evaluate predictive models for long-term food price forecasting

Solution 2: Assess the significance of regional and categorical features such as commodity type, geographic location, and seasonality in influencing food price predictions





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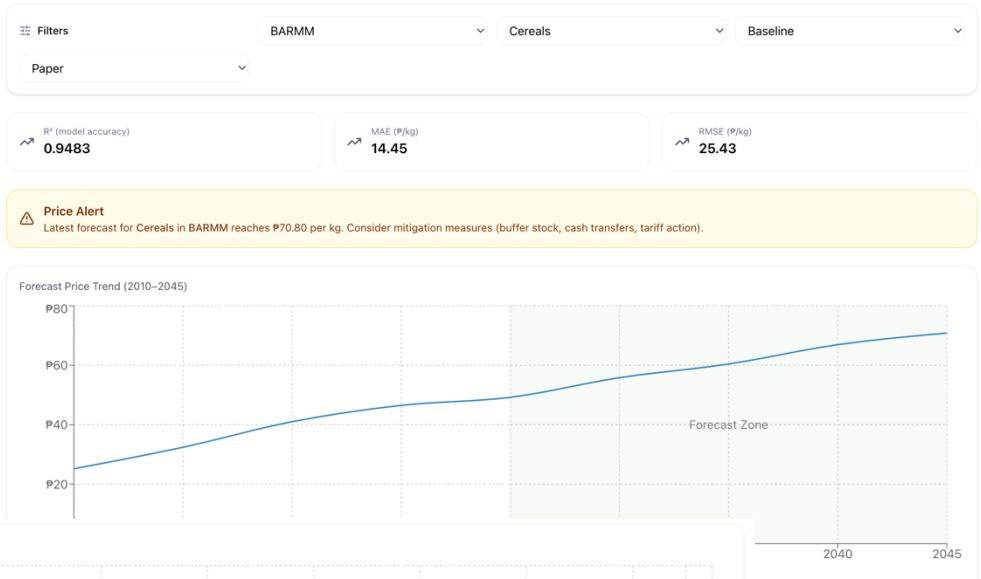
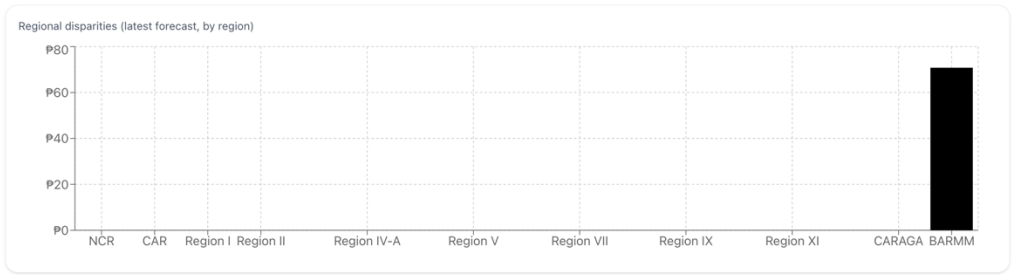
Solution 3: Design and implement an ICT-based forecasting platform





YEAR	PRICE (₱/KG)	TYPE
2010	₱25.18	Historical
2015	₱32.40	Historical
2020	₱41.00	Historical
2023	₱46.50	Historical
2025	₱49.20	Forecast
2030	₱55.80	Forecast
2035	₱60.40	Forecast
2040	₱66.90	Forecast
2045	₱70.80	Forecast

Solution 4: Facilitate regional knowledge transfer and collaboration, sharing methodologies, datasets, and tools with ASEAN partners to enable adaptation in diverse contexts.

The framework will be shared with ASEAN partners to promote regional replication and strengthen ICT-based food security collaboration.

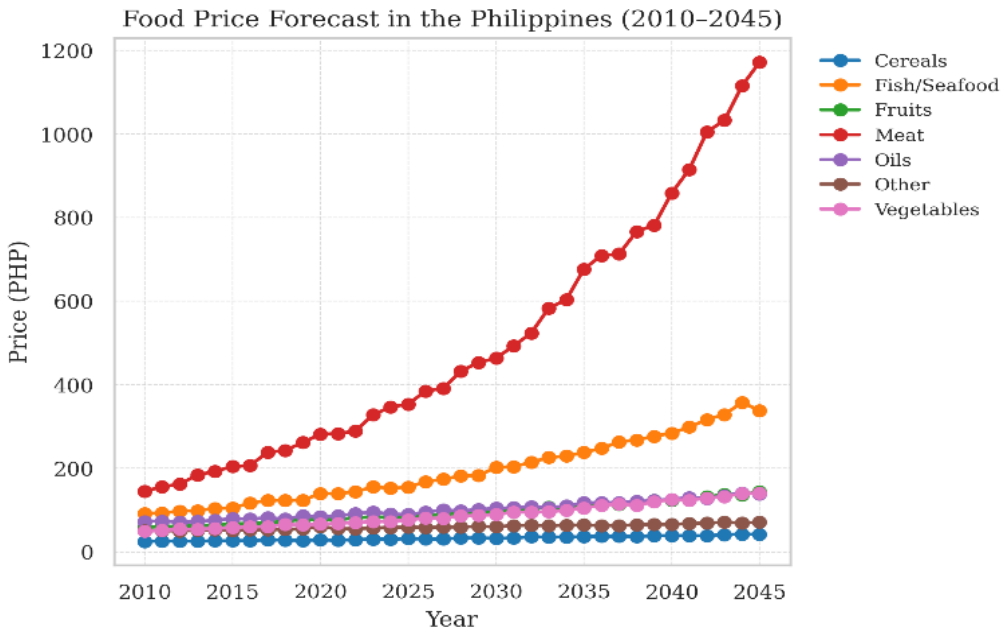
Impact:

- The system empowers Philippine policymakers and farmers with timely, AI-driven forecasts for more stable food prices.
- It strengthens national food security planning by identifying regional disparities and predicting future market conditions.
- Through its open, ICT-based framework, the project promotes transparency, resilience, and data-informed governance.
- Ultimately, it contributes to ASEAN food system stability and SDG 2: Zero Hunger through collaborative, technology-enabled forecasting.

Output/Outcome

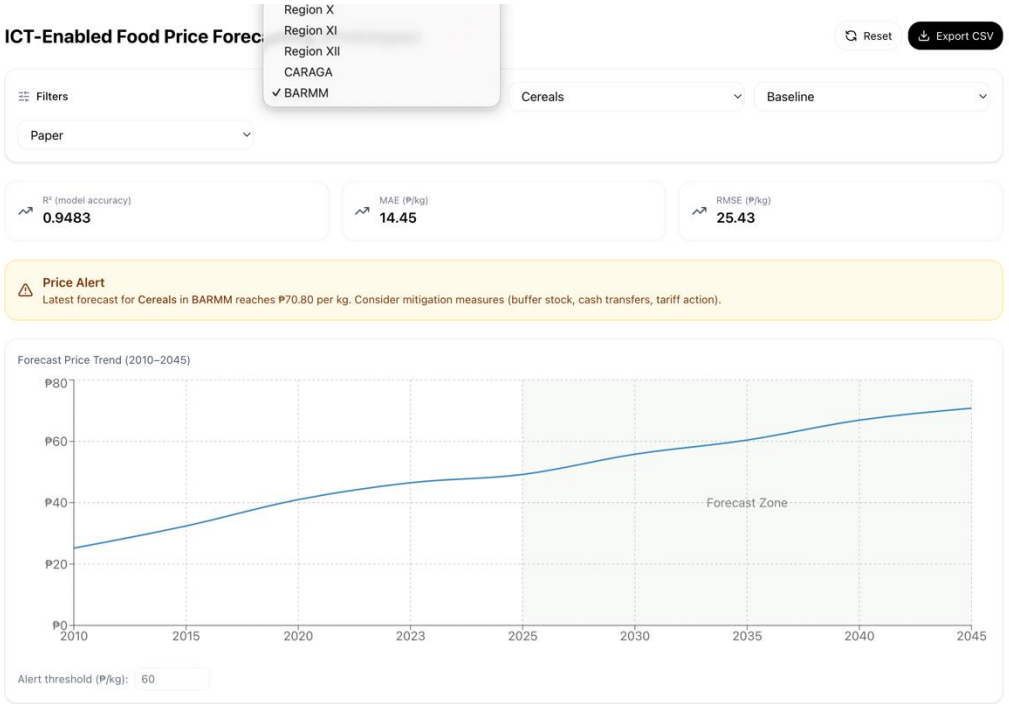
Scientific:

- The project produces a validated machine learning–based forecasting model capable of long-term food price prediction up to 2045.
- It introduces a novel ICT-integrated forecasting dashboard that demonstrates how AI and data science can be applied to food security analytics.
- This contributes to the growing field of applied AI in agricultural economics, providing a transferable model for similar use in other ASEAN nations.



Societal:

- The project generates an **open-access dataset** and **interactive forecasting tool** that can be used by policymakers, farmers, and researchers.
- It enables evidence-based decision-making, potentially reducing the impact of **price shocks** on low-income households and improving food affordability.
- The platform also encourages **data transparency and public participation** in food system monitoring.



Output/Outcome

Collaborative:

- The initiative establishes new partnerships among academic institutions, government agencies, and ASEAN ICT researchers.
- It opens opportunities for regional collaboration, joint research publications, and cross-border data sharing for food security.
- The model's open design invites future integration with regional partners in ASEAN and beyond.

Other Impact:

- The project contributes to UN SDG 2 (Zero Hunger) and SDG 9 (Industry, Innovation, and Infrastructure) through technological innovation in agriculture.
- It lays the groundwork for a regional early-warning system for food price instability under the ASEAN IVO framework.
- In the long term, it builds resilience, inclusivity, and innovation in Southeast Asia's digital food systems..

Conclusion

- The project will develop and evaluate a machine learning–based food price forecasting system to strengthen food security in the Philippines.
- It will also analyze regional and commodity-level drivers of price fluctuations and integrate findings into an ICT-enabled dashboard for real-time policy use.

- Using over 100,000 records from the WFP Philippines Food Prices dataset (2010–2023), models such as Linear Regression, Random Forest and Gradient Boosting will be trained to forecast prices up to 2045.
- An interactive web-based platform will be designed to visualize results, simulate policy scenarios, and issue early warnings for potential price shocks.

Conclusion

- Scientifically, the project will advance the application of AI in agricultural economics and introduce a reusable ICT framework for food price forecasting.
- Socially, it will empower farmers, traders, and policymakers through data-driven insights that enhance market stability and protect low-income consumers.

- The framework will be adaptable for ASEAN-wide collaboration, promoting regional cooperation in ICT and food security analytics.
- It will contribute to the UN SDG 2 (Zero Hunger) and strengthen ASEAN resilience against food price volatility.

END

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