

## Correlation of Causality of Salt Imports and Domestic Salt Prices

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### Abstract

*Salt is an important commodity for households and industries in Indonesia, with increasing national needs. However, domestic production is still limited, so dependence on imports is the main challenge. This study analyzes the causal relationship between salt imports and domestic prices using the Granger causality test with secondary data from the Ministry of Maritime Affairs and Fisheries (KKP) and the Central Statistics Agency (CSA) for the 2011–2023 period. The methods used are Vector Autoregression (VAR) and Vector Error Correction Model (VECM) to test long-term and short-term relationships. The results show that in the short term, salt imports do not have a direct causal relationship with domestic prices, but in the long term, there is a balance relationship between the two. In addition, domestic salt prices also do not directly affect import volumes in the short term, but contribute to import variability in the long term. These findings underscore the importance of balanced import policies to maintain price stability, protect local salt farmers, and meet the needs of the industry in a sustainable manner.*

**Keywords:** Salt, Imports, Salt Price, VAR, VECM, Causality.

### INTRODUCTION

Salt is an important commodity for households and industries in Indonesia, the main uses of salt are used as spices, preservatives, as well as in the food, pharmaceutical, textile, and chemical industries. As the industry grows, the demand for salt continues to increase.

The salt industry sector in Indonesia faces various challenges, including a high dependence on imports. The national salt demand reaches more than 4 million tons per

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IJEBIR, Volume 04 Issue 02, 2025



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year, while domestic production is often only able to meet a small part of that need. The demand for salt in Indonesia continues to increase every year. The increase in domestic salt demand can be seen in the growth graph from 2011 to 2023 in Figure 1 below.

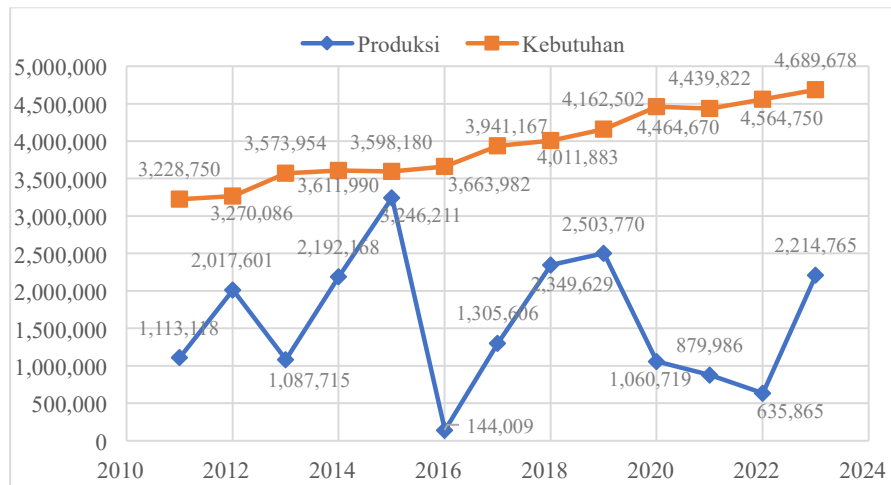


**Figure 1 Salt Demand and Production Graph, 2011-2023**

Source: Data processed from the Ministry of Maritime Affairs and Fisheries, 2024

The graph shows that domestic salt demand increased by an average of 3.2% per year, from 3.23 million tons in 2011 to 4.69 million tons in 2023. Meanwhile, salt production fluctuated, rising from 1.11 million tons in 2011 to 2.1 million tons in 2012, then falling back to 1.1 million tons. The biggest decline occurred in 2016, with production of only 144 thousand tons due to climate change and high rainfall that disrupted the production cycle.

National salt production only meets an average of 44.11% of the total needs, so imports are needed to cover the shortfall (Putri & Sugiarti, 2021). In addition, global trade integration makes imports also affected by price differences. Countries without comparative advantages tend to import salt, making price another factor driving imports in addition to limited domestic production (Safrida et al., 2021).

Indonesia has great potential in salt production, but various factors hinder its optimization. Global climate change causes unpredictable weather, which affects the quality and quantity of production in salt centers such as Madura and Cirebon. The longer rainy season slows down the production process that relies on seawater evaporation.

In addition to the weather, the low productivity of local salt is also influenced by the limitations of human resources and technology. Salt farmers still use traditional methods that are less efficient, producing salt with low NaCl levels. As a result, local salt often does not meet industry standards, especially food and pharmaceuticals. Meanwhile, imported salt is considered to be of higher quality because it is produced with modern technology that produces high NaCl levels and better purity (Rosmaida et al., 2024).

Imported salt goes through a careful refining process, resulting in products that comply with industry and consumption standards. In addition, the size is more uniform and free from impurities that can degrade quality. This factor encourages governments and business actors to import salt from countries such as Australia and India, which are able to produce salt with high and consistent NaCl levels.

**Table 1 Salt Imports by Country of Origin**

| Country of Origin | 2019             | 2020      | 2021      | 2022      | 2023      |
|-------------------|------------------|-----------|-----------|-----------|-----------|
|                   | Net Weight: Tons |           |           |           |           |
| Australia         | 1.869.684        | 2.227.522 | 2.108.345 | 1.998.383 | 2.158.031 |
| India             | 719.550          | 373.933   | 715.506   | 751.398   | 641.037   |
| New Zealand       | 4.052            | 4.076     | 3.488     | 4.382     | 5.138     |
| China             | 541              | 1.321     | 2.470     | 1.377     | 1.506     |
| Denmark           | 496              | 377       | 449       | 195       | 484       |
| Germany           | 243              | 231       | 202       | 286       | 304       |
| Thailand          | 449              | 331       | 375       | 425       | 1.028     |
| Other             | 279              | 229       | 248       | 181       | 329       |
| Sum               | 2.595.295        | 2.608.020 | 2.831.082 | 2.756.626 | 2.807.857 |

Source: Central Statistics Agency, 2024

Based on Table 1, Indonesia imports salt from several countries, with Australia as the main supplier. This dependence has sparked debate about its impact on local salt farmers and domestic price stability. On the one hand, imports are considered essential to meet the needs of the industry and prevent scarcity in the market.



Import policies are often criticized because they are considered detrimental to local salt farmers who have difficulty competing in price and quality (Alifah NurFauziyah, 2024). Indonesia has a large market that is attractive to other countries, but unfortunately, this potential is more utilized by foreigners than the local community itself (Hakim & Bustaram, 2019).

The government has implemented policies such as limiting import quotas and setting reference prices for domestic salt. However, this policy has not been fully effective in protecting salt farmers and stabilizing prices. In 2021, despite the restrictions on imports, domestic salt prices continued to fluctuate due to uncertainty over local production and inconsistent import policies.

The increase in domestic salt demand every year encourages the government to implement import policies because local production is insufficient (Jamil & Tinaprillia, 2017). Based on the Decree of the Minister of Industry and Trade No. 360/MPP/Kep/5/2004 Jo No. 3376/MPP/Kep/6/2004, imports are only allowed if domestic production is insufficient. This policy is strengthened by the Regulation of the Minister of Trade No. 20/M-DAG/PER/9/2005 Jo No. 44/M-DAG/PER/10/2007, which stipulates that salt imports can only be carried out by importers of iodized (consumption) and non-iodized (industrial) salt (Baihaki, 2013).

The government often reassured salt farmers that imports would not affect domestic prices, but the facts on the ground show the opposite (Jamil & Tinaprillia, 2017). The industry prefers imported salt because it is cheaper than local salt. In addition, rules on import timing are often not adhered to, with industrial companies making imports outside of the set schedule, which further depresses domestic salt prices (Baihaki, 2017). As a result, policies that were initially aimed at meeting the needs of the industry actually encouraged a surge in imports and lowered the price of salt for local farmers, making their products less in demand.

Fluctuations in domestic salt prices are a major concern, especially when there is a sharp spike or decrease. In recent years, salt prices in Indonesia have tended to be unstable, as shown in the figure below.



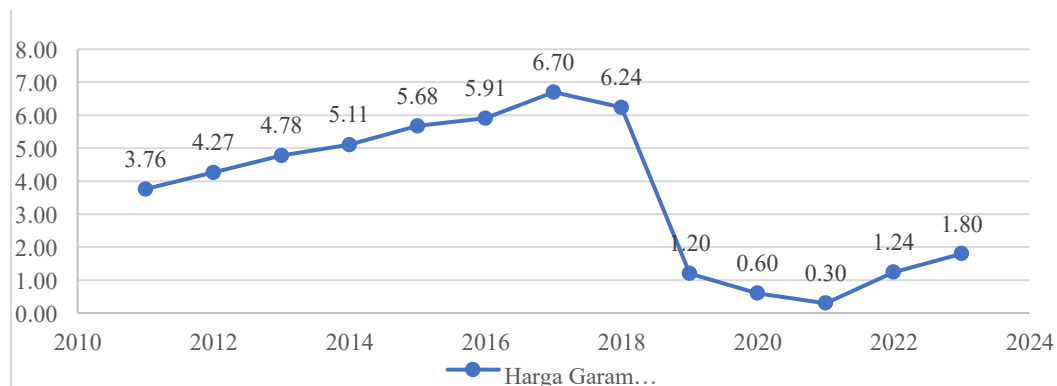


**Figure 2 Development of Salt Prices in Indonesia**

Source: Ministry of Maritime Affairs and Fisheries

Figure 2 shows the development of salt prices in Indonesia from 2011 to 2023. The price of salt increased from 2011 to 2017, then dropped drastically in 2018 and experienced a significant decrease until 2021, reaching only 0.3 million per ton. The biggest price increase occurred in 2017 due to the failure of local salt harvest due to bad weather, exacerbated by late import policies.

In 2020, the Covid-19 pandemic reduced exports and imports due to the paralysis of economic sectors, including international trade (Wahed & Setiawan, 2022). However, ironically, salt imports have increased sharply, causing domestic salt prices to plummet and to the detriment of local farmers. Farmers are forced to lower prices in order to compete, while cheaper imported salt prices make traders and consumers prefer imported products (Safrida et al., 2021).

In early 2017, the price of imported salt from Australia was US\$35 per ton (Rp 475,000 per ton or Rp 475 per kg), much cheaper than people's salt which reached Rp 6,000 per kg. This price difference has the potential to reduce the domestic salt market. The government should protect salt farmers, considering that in 2015, as much as 87.9% of national salt production came from people's salt, while PT. Salt only accounts for 12.1% (Ardiyanti, 2016). The public is disappointed with the plummeting salt prices due to import policies that are still open to various countries, causing domestic prices to be uncontrolled (Mustafa et al., 2021). This condition shows that there is a close relationship between salt import policies and fluctuations in domestic salt prices.

The price of a commodity is affected by the interaction of supply and demand. An increase in supply tends to lower prices, while a decrease in supply with demand will still drive up prices. Salt imports increase domestic supply, so if demand remains the same, salt prices tend to fall. However, high domestic salt prices can also encourage an increase in imports to meet market needs.

Previous research has shown that salt imports have a significant effect on domestic prices (Rosyidah et al., 2023). Innovation of tuf and geo membrane methods can increase salt production (Ramly et al., 2022), while the high import is caused by a lack of government policy support (Simamora, 2021). In addition, the quality of Indonesian salt still does not meet industry standards (Rosmaida et al., 2024).

The salt import quota policy in Indonesia has not succeeded in increasing the price and absorption of local salt (Lesmana, 2022). Ardyanto's research (2022) shows that imports actually increase salt production in Rembang, but also create dependence. Meanwhile, Suhendi (2020) assessed that the import policy has not been effective in supporting the local salt industry. Therefore, a policy review is needed to maintain supply while protecting domestic salt producers.

Previous research has focused more on the impact of imports, policies, and the empowerment of salt farmers, while studies on the relationship between salt imports and prices are still limited. The complexity of the salt problem in Indonesia, such as high imports, low production quality, low farmers' prices, and inappropriate policies, has an impact on the welfare of farmers. This research is expected to fill the literature gap and make a new contribution in understanding the dynamics of the salt market in Indonesia.

To understand the relationship between salt imports and domestic prices, an econometric approach, such as the Granger causality test, is needed. This test helps determine whether salt imports affect domestic prices or vice versa. In addition to looking at correlations, this test also reveals a cause-and-effect relationship, provides insight into the dynamics of the salt market and helps formulate price stabilization policies.

This study aims to analyze the causal relationship between salt imports and domestic prices in Indonesia with the Granger causality test. The results are expected to provide policy recommendations to manage imports and maintain price stability, protect local farmers, and meet industrial needs.



## **LITERATURE REVIEW**

### **Demand Theory**

Demand theory explains the inverse relationship between price and quantity of goods requested, assuming other factors remain constant (Mankiw et al., 2012). When prices rise, purchasing power decreases so that demand decreases, while price decreases increases demand because consumers are more able to buy. In the demand curve, the quantity requested and the price appear to be highly correlated. The demand for goods is the number of goods that consumers prepare to buy at a certain price.

### **Salt Commodity Demand Pattern**

Salt is a staple ingredient used as a flavor enhancer and nutrient in food, as well as as an industrial raw material. The national salt demand reaches more than 4.6 million tons per year (Ministry of Industry), but domestic production is not optimal, so Indonesia still imports salt. As the population and industry grow, the demand for salt continues to increase. Dependence on imports can pose risks to industrial sectors, such as food, chemicals, refining, and health, especially for countries that do not have sufficient salt natural resources.

### **Supply Theory**

Offer law applies to substitute and complementary goods. If the price of substitute goods rises, producers tend to increase their production to earn greater profits. Conversely, if the price of complementary goods increases, the supply of key goods can also increase. In general, the law of supply states that the higher the price of an item, the greater the incentive for the producer to offer it, and vice versa. The supply curve is sloping upwards, reflecting that producers will increase the number of goods offered as prices rise, assuming other factors remain constant.

### **Theory of Comparative Excellence**

This theory suggests that each country should produce goods or services at a lower opportunity cost than other countries and import goods that are more efficiently produced abroad (Salvatore, 2013). Opportunity cost is the best alternative value sacrificed when choosing an action. In international trade, even if a country does not have an absolute advantage, it can still have a comparative advantage if it can produce goods at a lower opportunity cost (Krugman & Obstfeld, 2009).



**Price Theory**

According to Dolan and Simon (1996), price is the value that buyers exchange to obtain products or services from sellers. Monroe (1990) emphasized that price is an economic sacrifice made by customers to get a product or service. These two views complement each other, where price serves as a means of transaction as well as a measure of value in the economy.

**RESEARCH METHODS****Research Location**

The object of this research is the state of Indonesia with the time in this research process taken from 2011 to 2023.

**Data Sources and Data**

This research data uses secondary data sourced from a second party and can be used directly with the aim of being published to the public. Secondary data is obtained through the Ministry of Maritime Affairs and Fisheries (KKP) and the Central Statistics Agency (CSA). The data used in the study is data on the amount of salt imported in units of tons and the price of salt in rupiah.

**Data Analysis**

This study uses the Vector Autoregression (VAR) method and continues with the Vector Error Correction Model (VECM) if the data is not stationary at the level level but has cointegration. The analysis was carried out using EViews 12 software for efficient data processing. Analysis with the VECM model can be used to analyze the correction of dependent variables due to several unbalanced variables. The equation model from VECM is:

$$\begin{aligned}\Delta P_{it} &= \alpha_0 + \sum_{j=1}^n \beta_{1j} \Delta P_{i,t-j} + \sum_{j=1}^n \beta_{2j} \Delta I_{i,t-j} + \gamma_{ei,t-j} + \varepsilon_{it} \\ \Delta CO_{it} &= \alpha_0 + \sum_{j=1}^n \beta_{1j} \Delta I_{i,t-j} + \sum_{j=1}^n \beta_{2j} \Delta P_{i,t-j} + \gamma_{ei,t-j} + \varepsilon_{it}\end{aligned}$$

**Information:**

$\Delta P_{it}$  : Price Variable at the level of first difference

$\Delta I_{it}$  : Salt Import Variable at the first difference level



**RESULT****Descriptive Analysis and Descriptive Statistics****Table 2 Descriptive Analysis**

|             | Salt Price | Salt Imports |
|-------------|------------|--------------|
| Mean        | 4434615.   | 2267837.     |
| Median      | 4920000.   | 2595294.     |
| Maximum     | 10630000   | 2838708.     |
| Minimum     | 358000.0   | 1032505.     |
| Std. Dev.   | 3567630.   | 651542.2     |
| Skewness    | 0.462593   | -0.991858    |
| Curtosis    | 2.142011   | 2.539792     |
|             |            |              |
| Jarque-Bera | 0.862396   | 2.246250     |
| Probability | 0.649730   | 0.325262     |

Source: Ereviews Processed 12, 2025

Descriptive analysis shows that the average domestic salt price in Indonesia during 2011–2023 is Rp 4,434,615 per ton, with a median of Rp 4,920,000 per ton, indicating a price spike in a certain period. The highest price reached Rp 10,630,000 per ton due to a decrease in production or unstable import policies, while the lowest price of Rp 358,000 per ton was caused by an abundance of import supply. The standard deviation of IDR 3,567,630 reflects significant price fluctuations. Meanwhile, the average volume of salt imports is 2,267,837 tons per year with a median of 2,595,294 tons, indicating that the majority of imports are higher than average. The highest volume reached 2,838,708 tons due to high industrial demand, while the lowest volume of 1,032,505 tons occurred due to import restrictions or increased domestic production. The standard deviation of 651,542 tons indicates fluctuations in import volumes influenced by domestic trade and production policies.



**Stationary Test****Table 3 Stationare Test with Dickey-Fuller Augmented**

| <i>Augmented Dickey-Fuller test statistic</i> | t-Statistic | Prob.* |
|-----------------------------------------------|-------------|--------|
| Salt Price                                    | -3.682463   | 0.0225 |
| Salt Imports                                  | -4.267562   | 0.0104 |

Source: Ereviews Processed 12, 2025

The results of the Stationary Test with Augmented Dickey-Fuller (ADF) show that the domestic and imported salt prices have a probability of less than 0.05, which is 0.0225 and 0.0104, respectively. This indicates that both variables have been stationary at the level level, so they do not contain a trend that could lead to false regression. Thus, the data can be directly used in advanced analyses such as Granger causality tests and Vector Error Correction Model (VECM) estimation, ensuring that the results of the study are valid without distortion of long-term trends.

**Determination of Optimal Log Length****Table 4 Optimum Lag Test**

| Lag | LogL      | LR        | FPE       | AIC       | SC        | HQ        |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 0   | -343.0066 | NA        | 6.00E+24  | 62.72848  | 62.80082  | 62.68287  |
| 1   | -336.1021 | 10.04299* | 3.64e+24  | 62.20037  | 62.41741  | 62.06356  |
| 2   | -329.0359 | 7.708565  | 2.34e+24* | 61.64289* | 62.00461* | 61.41487* |

Source: Ereviews Processed 12, 2025

The results of the Optimum Lag Test show that lag 2 is the best lag in this study, based on the criteria of Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ), which have the lowest score compared to other lags. The selection of lag 2 is considered optimal to capture the dynamic relationship between salt imports and domestic salt prices, ensuring that the model used is more accurate, valid, and unbiased in both short-term and long-term relationship analysis.



**Stability Test****Table 5 Stability Test**

| Root                  | Modulus  |
|-----------------------|----------|
| 0.214011 - 0.946396i  | 0.970292 |
| 0.214011 + 0.946396i  | 0.970292 |
| -0.112896 - 0.561825i | 0.573055 |
| -0.112896 + 0.561825i | 0.573055 |

**Source: Ereviews Processed 12, 2025**

The results of the VAR Stability Test show that the model used in this study is stable, characterized by all modulus values of the Roots of Characteristic Polynomial which are below 1. This ensures that the model can be used for further analysis without experiencing instability issues. Meanwhile, the Johansen Cointegration Test was carried out to test the long-term relationship between salt imports and domestic salt prices. If a cointegration is found, then the relationship between the two variables can be further analyzed using the Vector Error Correction Model (VECM).

**Johanes Cointegration Test****Table 6 Johansen cointegration test**

| Unrestricted Cointegration Rank Test (Trace) |            |            |                |         |
|----------------------------------------------|------------|------------|----------------|---------|
| Hypothesized                                 |            | Trace      | 0.05           |         |
| No. of CE(s)                                 | Eigenvalue | Statistics | Critical Value | Prob.** |
| None *                                       | 0.736340   | 20.45610   | 15.49471       | 0.0082  |
| At most 1 *                                  | 0.609296   | 8.458246   | 3.841465       | 0.0036  |

**Source: Ereviews Processed 12, 2025**

The results of the Johansen Cointegration Test show that there is a long-term relationship between salt imports and domestic salt prices. Trace Statistical values greater than critical values and probabilities below 5% confirm the existence of cointegration. Therefore, the model used is more appropriate if analyzed using the Vector Error Correction Model (VECM) compared to ordinary VAR. These results confirm that changes in salt imports not only have an impact in the short term, but also have a significant effect on domestic salt prices in the long term. The government's salt import



policy has the potential to affect the stability of salt prices in Indonesia, which can have an impact on the welfare of local salt farmers as well as industries that depend on imported salt.

### VAR/VECM Model Estimation

**Table 7 Vector Error Correction Model (VECM)**

| Variable                                  | Coefficient       | Error Standards    | t-Statistic       |
|-------------------------------------------|-------------------|--------------------|-------------------|
| <b>Cointegrating Equation:</b>            |                   |                    |                   |
| PRICE(-1)                                 | 1.000000          | -                  | -                 |
| D(Import(-1),2)                           | <b>2.562058</b>   | <b>(1.91798)</b>   | <b>[1.33581]</b>  |
| C                                         | -6.163.519        | -                  | -                 |
| <b>Error Correction Term (ECT):</b>       |                   |                    |                   |
| CointEq1 (D(PRICE))                       | -1.402316         | (0.44483)          | [-3.15249]        |
| CointEq1 (D(IMPOR,3))                     | <b>-0.106639</b>  | <b>(0.11294)</b>   | <b>[-0.94417]</b> |
| <b>Other Variables in the VECM Model:</b> |                   |                    |                   |
| D(PRICE(-1))                              | <b>1.038576</b>   | <b>(0.45648)</b>   | <b>[2.27520]</b>  |
| D(Import(-1),3)                           | 1.110571          | (1.07818)          | [1.03005]         |
| C                                         | <b>-1.401.985</b> | <b>(1.109.881)</b> | <b>[-1.26318]</b> |
| <b>Model Statistics:</b>                  |                   |                    |                   |
| R-squared (D(PRICE))                      | <b>0.716183</b>   |                    |                   |
| R-squared (D(IMPOR,3))                    | 0.419581          |                    |                   |
| Adj. R-squared (D(PRICE))                 | <b>0.545893</b>   |                    |                   |
| Adj. R-squared (D(IMPOR,3))               | 0.071329          |                    |                   |
| F-statistic (D(PRICE))                    | <b>4.205671</b>   |                    |                   |
| F-statistic (D(IMPOR,3))                  | 1.204821          |                    |                   |
| Akaike AIC (D(PRICE))                     | <b>32.94561</b>   |                    |                   |
| Akaike AIC (D(IMPORT,3))                  | 30.20402          |                    |                   |
| Schwarz SC (D(PRICE))                     | <b>33.03327</b>   |                    |                   |



|                          |    |          |  |  |
|--------------------------|----|----------|--|--|
| Schwarz<br>(D(IMPORT,3)) | SC | 30.29168 |  |  |
|--------------------------|----|----------|--|--|

Source: Ereviews Processed 12, 2025

### 1. Long-Term Relationship (Cointegration Equation)

In the long term, an increase of 1 ton of salt imports has the potential to increase domestic salt prices by 2.56 rupiah per ton. However, since the t-statistic value is only 1.33581, this relationship is not significant. Therefore, further research is still needed to ascertain whether imports really affect salt prices in the long term.

### 2. Short-Term Relationship (Error Correction Term - ECT)

The CointEq1 coefficient of -1.402316 with t-statistics -3.15249 indicates that in the event of an imbalance in domestic salt prices, the correction mechanism will return it to equilibrium at a rate of 140% in a period. Meanwhile, the CointEq1 coefficient at D(IMPORT,3) of -0.106639 with t-statistics of -0.94417 shows that in the short term, salt imports have no significant effect on domestic salt prices.

### 3. The Effect of Free Variables on Domestic Salt Prices

a. The D(PRICE(-1)) coefficient of 1.038576 shows that the price of salt in the previous period still has a positive influence on the current price with a t-statistic of 2.27520, which is quite strong in explaining the dynamics of domestic salt prices.

b. The coefficient D(import(-1),3) of 1.110571 with a t-statistic of 1.03005 shows that salt imports in the short term have not had a significant effect on domestic salt prices.

### 4. Goodness of fit (R-squared and F-statistic)

The model can explain 71.6% of the variability of domestic salt prices, while the variability of salt imports is only explained by 41.9%, indicating the existence of other external factors that affect imports.

Overall, salt imports have the potential to affect prices in the long term, but in the short term prices are more affected by previous conditions. Therefore, salt import policies need to be carefully managed to avoid price volatility that can harm local salt farmers.



## Granger Causality Test

**Table 8 Granger Causality**

| Null Hypothesis:                    | Obs | F-Statistic | Prob.  |
|-------------------------------------|-----|-------------|--------|
| IMPORT does not Granger Cause PRICE | 11  | 0.17456     | 0.8439 |
| PRICE does not Granger Cause IMPORT |     | 0.46539     | 0.6488 |

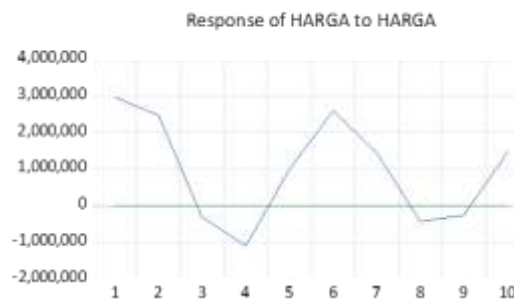
Source: Ereviews Processed 12, 2025

The results of the Granger Causality Test show that there is no significant causal relationship between salt imports and domestic salt prices in the short term, with a probability greater than 5%. This means that changes in salt imports do not directly affect domestic salt prices, and vice versa. The relationship between the two is more likely to be long-term, as confirmed in the Johansen cointegration test and the VECM model. Other factors such as domestic production, trade policies, weather, and industrial demand also affect salt prices. Therefore, salt import policies must consider various aspects of the economy, not just the price mechanism.

## Impulse Response Function (IRF) Analysis

**Figure 3 Impulse Response Function (IRF) Price with Price**

Response to Cholesky One S.D. (d.f. adjusted) Innovations



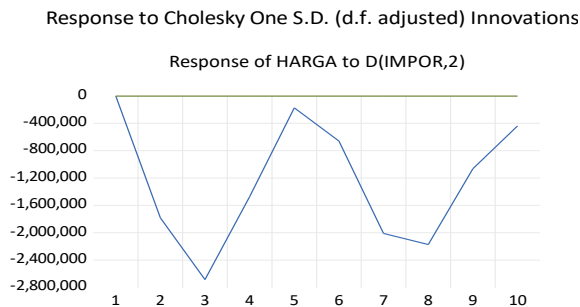
Source: Ereviews Processed 12, 2025

The Impulse Response Function (IRF) chart shows that the price of salt reacts significantly to shocks in the short term. Initially, there was a large price increase during the first one to two periods, but this response weakened and became negative in the fourth period. Furthermore, the price fluctuates until around the tenth period before



returning to equilibrium. This indicates that the impact of the shock is temporary, and the market tends to stabilize in the long term. Therefore, appropriate policies are needed to reduce fluctuations in salt prices in the short term so as not to harm producers and consumers.

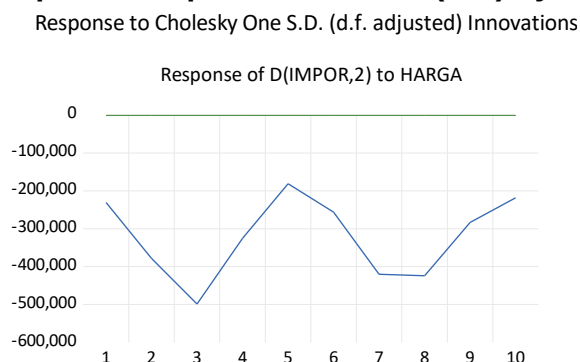
**Figure 4 Impulse Response Function (IRF) Price with Imports**



Source: Ereviews Processed 12, 2025

The Impulse Response Function (IRF) graph shows that shocks in salt imports have a significant impact on domestic salt prices in the short term. Initially, increased imports suppressed local salt prices until the third period, which could be detrimental to domestic salt farmers. However, in the fourth to fifth period, the price begins to recover, and after that shows fluctuations up to the tenth period. Although prices tend to move towards stability at the end of the period, they have not fully returned to equilibrium. This emphasizes the importance of careful import management so as not to cause price volatility that is detrimental to the domestic market.

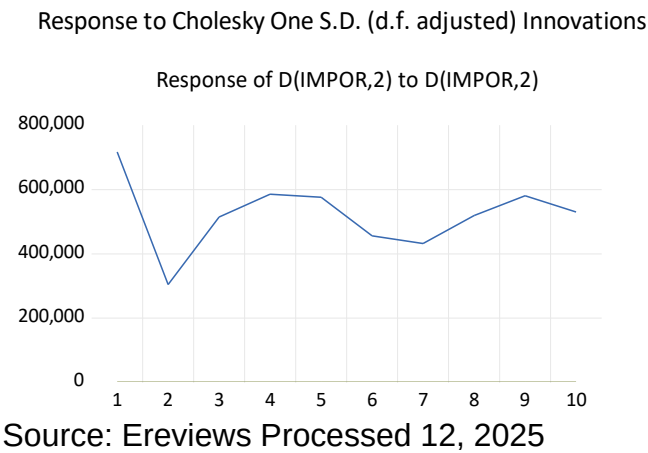
**Figure 5 Import Impulse Response Function (IRF) by Price**



Source: Ereviews Processed 12, 2025

The Impulse Response Function (IRF) chart shows that shocks in domestic salt prices initially had a negative impact on salt imports, with significant declines through the third period. This suggests that rising salt prices could reduce imports in the short term, likely due to higher costs or increased local supply. After the third period, imports began to recover, but fluctuated until the seventh period before finally moving towards stability in the eighth to tenth period. These findings emphasize the need for trade policies that consider the relationship between salt prices and imports to maintain supply and price stability in the domestic market.

Figure 6 Import with Import Impulse Response Function (IRF)



The Impulse Response Function (IRF) graph shows that shocks in salt imports initially triggered a significant spike in the first period, followed by a drastic decline in the second period. After that, imports increased steadily again until the fifth period, then experienced fluctuations before starting to stabilize in the eighth to tenth period. This pattern suggests that salt imports are responsive to market changes, but have a mechanism to readjust. Therefore, import policies must consider the short-term and long-term impacts to maintain the stability of domestic salt supply.

A. Vriance decomposition (VDC) analysis

Table 9 Variance Decomposition Salt Price

| Variance Decomposition of PRICE: |          |          |             |
|----------------------------------|----------|----------|-------------|
| Period                           | S.E.     | PRICE    | D(Import,2) |
| 1                                | 2967758. | 100.0000 | 0.000000    |



|    |          |          |          |
|----|----------|----------|----------|
| 2  | 4246839. | 82.42254 | 17.57746 |
| 3  | 5034506. | 59.05435 | 40.94565 |
| 4  | 5360135. | 56.31685 | 43.68315 |
| 5  | 5454457. | 57.71220 | 42.28780 |
| 6  | 6073256. | 64.70856 | 35.29144 |
| 7  | 6559592. | 60.35834 | 39.64166 |
| 8  | 6923719. | 54.57591 | 45.42409 |
| 9  | 7009932. | 53.38488 | 46.61512 |
| 10 | 7173760. | 55.11542 | 44.88458 |
|    |          |          |          |

Source: Ereviews Processed 12, 2025

At first, the variability of salt prices was entirely influenced by itself, while imports did not contribute. However, over time, the influence of salt imports increased, reaching 46.61% in the ninth period. In the tenth period, the contribution of imports to salt prices was 44.88%, while salt prices were still the dominant factor with 55.11%. This shows that in the short term, salt prices are more influenced by its internal dynamics, but in the medium to long term, imports play a significant role. Therefore, import policies must be managed properly to maintain the stability of domestic salt prices.

**Table 10 Variance Decomposition of Salt Imports**

| Variance Decomposition of D(IMPOR,2): |          |          |             |
|---------------------------------------|----------|----------|-------------|
| Period                                | S.E.     | PRICE    | D(Import,2) |
| 1                                     | 753527.7 | 9.384846 | 90.61515    |
| 2                                     | 896462.0 | 24.45644 | 75.54356    |
| 3                                     | 1147737. | 33.82249 | 66.17751    |
| 4                                     | 1329049. | 31.22907 | 68.77093    |
| 5                                     | 1459756. | 27.42740 | 72.57260    |
| 6                                     | 1550579. | 27.03705 | 72.96295    |
| 7                                     | 1663614. | 29.86664 | 70.13336    |
| 8                                     | 1793650. | 31.28563 | 68.71437    |
| 9                                     | 1906476. | 29.89976 | 70.10024    |
| 10                                    | 1990839. | 28.62003 | 71.37997    |

Source: Ereviews Processed 12, 2025



Initially, salt imports were more influenced by themselves (90.62%), while salt prices only contributed 9.38%. However, the influence of salt prices increased, reaching its peak in the third period with 33.82%, then stabilizing in the range of 27-31% until the tenth period. In the last period, the contribution of salt prices to imports was 28.62%, while imports remained dominant with 71.38%. This shows that in the short term, imports are more influenced by internal factors, but in the long term, salt prices begin to have a significant impact. Therefore, price policy needs to consider its impact on import volumes to maintain market balance.

### **Causality Relationship between Salt Imports and Domestic Salt Prices**

This study shows that there is no direct causal relationship between salt imports and domestic salt prices in the short term, as evidenced by the Granger Causality Test. However, Johansen's cointegration analysis revealed a long-term equilibrium relationship, where an increase in imports could affect the stability of salt prices in Indonesia. In accordance with the theory of supply and demand, the increase in supply due to imports tends to suppress market prices, with a more pronounced impact in the long term once the market adapts.

The findings emphasize the importance of balanced import policies to maintain market stability and protect local salt farmers. If not properly regulated, an increase in imports can drastically suppress domestic salt prices. IRF analysis shows that import shocks tend to lower salt prices in the short term, but the market then adjusts. Meanwhile, VDC results revealed that the role of imports in influencing salt price variability continued to increase in the long term, reaching 44.88% in the tenth period. This confirms that imports have a significant impact on domestic salt price volatility, so trade policies must be carefully managed.

This research is in line with the study of Astuti et al. (2019) which shows that import policies without considering local production capacity can reduce the price of salt for farmers and hinder the absorption of domestic supply. In addition, Hardinandar & Firmansyah (2023) emphasized that despite the increase in import costs, the industry still relies on high-quality imported salt. Therefore, import policies must be designed to maintain price stability and farmers' welfare, with strategies that not only meet the needs of the industry but also increase domestic production to gradually reduce dependence on imports.



### **Causality Relationship between Domestic Salt Prices and Salt Imports**

This study shows that in the short term, changes in domestic salt prices do not significantly affect the volume of salt imports, as evidenced by the Granger Causality Test with a probability of 0.6488. However, Johansen's cointegration analysis indicates a long-term relationship between the two variables. This means that although it does not have a direct impact in the same period, fluctuations in domestic salt prices can affect import policies and decisions in the long run.

The relationship between domestic and imported salt prices is in line with the theory of comparative advantage, where rising domestic salt prices encourage industries to seek more affordable imported supplies. However, in the short term, import decisions are more influenced by government policies and industry needs. The Impulse Response Function (IRF) analysis shows that the increase in domestic salt prices initially lowered import volumes, but imports began to recover after the third period, reflecting the market adjustment mechanism. Meanwhile, the results of Variance Decomposition (VDC) revealed that domestic salt prices contributed significantly to import variability in the long term, reaching 33.82% in the third period and stable in the range of 27-31% until the tenth period. This confirms that domestic salt prices play a role in determining import volumes, although they are not the only influencing factor.

Research shows that in addition to domestic salt prices, factors such as GDP, the US dollar exchange rate, and the amount of money supply have an effect on the volume of salt imports. In the long term, the increase in GDP and the amount of money supply encouraged imports, while the appreciation of the rupiah decreased it. Other studies also confirm that government policies, such as Government Regulation Number 9 of 2018, play a role in regulating salt imports to protect local producers, although the industry remains dependent on high-quality imported salt. These findings emphasize that domestic price stabilization policies must be balanced with increasing local production capacity through investment in technology and efficiency. This step can reduce dependence on imports, maintain the welfare of local producers, and ensure the sustainability of the salt industry in Indonesia.

### **CONCLUSION**

The study concluded that salt imports do not have a direct causal relationship with salt prices in the short term, but in the long term, the two have a balanced relationship, showing the continued impact of import policies on domestic price stability. In addition, domestic salt prices also do not directly affect import volumes in the short term, but in the

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long term, salt prices contribute to import variability, so they can be a consideration factor in future import policies.

### SUGGESTION

The government needs to develop a flexible salt import policy by gradually adjusting quotas to maintain market balance, as well as increase domestic production capacity through technology investment and incentives for local salt farmers. A price stabilization mechanism is also needed to anticipate fluctuations due to imports. Salt farmers are encouraged to apply modern technology to improve product quality and strengthen cooperation with industry so that local production is more absorbed. Academics and researchers are advised to examine other factors that affect the relationship between salt imports and prices, such as exchange rates, climate change, and global trade policies, in order to provide more accurate policy recommendations to balance the needs of the industry and the protection of local salt farmers.

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