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ORIGINAL ARTICLE

# Impacts of the sensitive list import tariffs of processed shrimps on the Indonesian economy under the ASEAN-China free trade area

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**Abstract**
Processed shrimp, as it has export potential and centrality to Indonesia's fisheries sector, is categorized as one of the Sensitive List (SL) products. The government of Indonesia protects this product from immediate exposure to foreign competition. This study aims to analyse the impacts of import tariffs of processed shrimps categorised as products in the sensitive lists on trade, income, and welfare under the Association of Southeast Asian Nations (ASEAN)-China Free Trade Area (ACFTA) agreement. The data were obtained from the UN Commission Trade (UN Comtrade) data (2002–2021). The data were analysed by applying the SMART partial equilibrium model. The results show that Indonesia's higher tariffs under the SL reduce trade creation and divert trade flows, with limited gains in tariff revenue. Moreover, these protectionist measures lead to welfare losses, while further liberalisation, particularly through tariff reductions, produces more favourable economic effects. The benefits, however, are primarily concentrated in China rather than being shared evenly across ASEAN partners. The findings suggest that while the SL designation provides strategic protection, its long-term effectiveness depends on complementary domestic reforms to boost productivity, efficiency, and competitiveness in Indonesia's shrimp processing industry. This study offers timely insights to inform policy reform and regional trade negotiations in fisheries.

**Keywords** Processed shrimps · Sensitive list · SMART model · ACFTA · Indonesia

**JEL Classification** F13 · F14 · F53

Extended author information available on the last page of the article

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## Introduction

Over the past five decades, the proliferation of free trade agreements (FTAs) has significantly reshaped the global trade landscape, with numerous studies highlighting their growing number, complexity, and geopolitical significance (Feng et al. 2023; Chen et al. 2022; Yanase and Tsubuku 2021). According to WTO (2025), there are currently 374 regional FTAs worldwide, with an annual expansion rate of 7.5%. These agreements are theoretically intended to reduce trade barriers, enhance efficiency, and address domestic market failures (Grübler and Reiter 2021; Kumar and Ahmed 2014; Kitwiwattanachai et al. 2010; Stiglitz 2006; Rodrik 2002; Tongzon 2005). Numerous empirical studies have confirmed that FTAs contribute positively to economic growth by facilitating greater market access and investment flows (Khan et al. 2022; Pasara and Diko 2020; Chiunjira 2020; Vu 2016). For instance, Kali et al. (2007) found that the number and concentration of trade partners are associated with higher growth, particularly in lower-income countries.

However, the benefits of FTAs remain uneven, especially in developing economies with fragile sectors and structural weaknesses (Suriaganth and Abdullah 2024; Baena-Rojas and Herrero-Olarte 2020; Baier et al. 2016; Panagariya and Duttagupta 2002). These disparities have spurred debates over how liberalisation should proceed in countries with limited institutional or technological readiness.

To address such asymmetries, many FTAs incorporate flexibility mechanisms such as the Sensitive List (SL), which allows member states to temporarily delay tariff reductions on strategic goods. Within the Association of Southeast Asian Nations (ASEAN)-China Free Trade Area (ACFTA), the SL mechanism permits exclusion of up to 400–500 tariff lines from liberalization (Tham and Kam 2014). Since 2010, Indonesia has placed several sensitive products in its SL and Highly Sensitive List (HSL), including processed shrimp, a high-value fishery commodity.[1]

SLs are widely used to protect sensitive sectors such as agriculture, manufacturing, and fisheries (Calì et al. 2019; Nakagawa and Liang 2011; Kawai and Wignaraja 2010). While these mechanisms can serve as transitional buffers, overreliance on them may reduce incentives for innovation and entrench inefficiencies, as argued by Peng and Yang (2024) and Trakem and Fan (2024). Supporting literature also warns that poorly managed SLs can distort trade, hinder regional integration, and become tools for covert protectionism (Rho and Tomz 2017; Gaurav et al. 2015; Kumar and Ahmed 2014; Koli et al. 2023).

Indonesia exemplifies the policy tension between protection and competitiveness. As the largest economy in ASEAN, Indonesia plays a pivotal role in the ACFTA and has strategically used SLs to safeguard key industries, such as textiles, automotive components, and processed seafood (Azizurrohman and Hartarto 2019; Ismanto and Khrisnamurti 2014). Among these, processed shrimp has emerged as a critical subsector due to its export potential and centrality to the country's fisheries sector

[1] All ten ASEAN member states participate in the SL mechanism under ACFTA. However, the schedules and thresholds vary. ASEAN-6 countries (Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand) follow a faster liberalization schedule, while Cambodia, Laos, Myanmar, and Vietnam (CLMV) countries are allowed more flexibility and longer transition periods.

(Wati 2023; Satrio et al. 2023). In 2022, shrimp products (HS code 0306) accounted for 41.1% of Indonesia's total fishery export value, reaching approximately USD 1.7 billion (trademap.org 2024).

Recognising the shrimp industry's economic relevance and vulnerability, the Indonesian government has launched broad upstream–downstream interventions, such as regulation of aquaculture practices, species-based restrictions, limited import licensing for hotel, restaurant, and catering (Horeca) and processors, certification and safety standards, digital trade integration through the Indonesia National Single Window (INSW) and National Logistics Ecosystem (NLE), and fiscal/infrastructure support for smallholders. The shrimp industry is also featured in the 2025–2029 National Medium-Term Development Plan (RPJMN) as a strategic pillar of Indonesia's blue economy agenda (Ministry of Trade 2021; Ministry of National Planning and Development 2025).

However, Indonesia's processed shrimp industry remains structurally constrained despite the above efforts. Challenges include underutilized production capacity, high operational costs, fragmented supply chains, and lagging competitiveness compared to India, Ecuador, and Vietnam (Manalu 2019; Nurfitri 2015; Karunia 2023). The situation is exacerbated by anti-dumping duties in major markets, such as the United States, prompting urgent calls for value chain upgrading (Krisandi 2024). Moreover, imports of processed shrimp from ACFTA partners have increased by 40–60% over the past three years, further pressuring domestic producers (Aswad and Azijah 2021; ERIA 2021).

Despite the sector's strategic importance, few empirical studies have specifically analysed the economic impacts of Indonesia's SL for processed shrimp under ACFTA. The existing literature has explored the macroeconomic effects of the agreement without estimating trade, welfare, or tariff outcomes (Wiranata 2024; Mahdi and Suharno 2021; Faqih 2021; Dewi and Sahara 2019; Syahidah and Suhadak 2016; Syahrin et al. 2016; Santoso and Fahruriza 2013; Setiawan 2012; Feridhanusetyawan and Pangestu 2010; Afrizal 2016).

Based on the rationale and background discussed above, this study aims to fill that gap by empirically examining the impacts of Indonesia's SL on processed shrimp imports under ACFTA, focusing on trade flows, tariff revenue, consumer surplus, and national welfare. This research contributes to a better understanding of how temporary protection mechanisms can affect long-term competitiveness in an export-oriented sector.

Furthermore, the study's relevance goes beyond ACFTA. All ten ASEAN-centred FTAs involving Indonesia include SL provisions, and the newer Regional Comprehensive Economic Partnership (RCEP), signed in 2020, also incorporates them (Syarip 2020; Estrades et al. 2023).[2] Thus, understanding the real economic impacts of SLs is crucial for developing future-proof trade strategies that strike a balance between flexibility and reform, and aligning policy instruments with structural transformation goals.

The remainder of this article is structured as follows. Section 2 details the data sources and research methodology employed to assess the effects of the SL of pro-

[2] SL features are also present in other ASEAN + 1 FTAs, such as AJCEP, AANZFTA, AKFTA, and RCEP.

cessed shrimps on trade, tariff revenue, welfare, and consumer surplus. Section 3 presents and discusses empirical results, including trends in shrimp imports and simulated policy impacts. Section 4 concludes the study and outlines key policy implications and highlights its limitations.

## Source of data and methods

### Source of data

As mentioned at the outset, this study aims to analyse the impact of SL import tariffs of processed shrimp under the ACFTA on Indonesia's economy, with particular attention to trade performance, revenue, welfare, and consumer surplus. However, before addressing these issues, we first review the development of shrimp imports from the ASEAN member states and China as the background for the analysis.

The source of data to address these objectives was extracted from the UN Commission trade (UN Comtrade) statistics in 2002 and 2021 (UN Comtrade 2022). This data was selected because it provides comprehensive records of Indonesia's shrimp import values from China and other ASEAN member states (Malaysia, Singapore, Thailand, Brunei Darussalam, the Philippines, Cambodia, Vietnam, Laos, and Myanmar). Also, by using this data, we estimated the average share of processed shrimp imports between the pre-SL policy (2002–2010) period and the post-SL policy period (2011–2021). In other words, we did not make any comparison periods between the 2002–2010 and 2011–2021 periods, as these two periods have different policies and economic contexts that may have influenced the economy under study. Using this data, we applied a descriptive method to examine the development of Indonesia's shrimp imports from the ASEAN and Chinese markets. Additionally, by utilising this data, we further analysed the impact of SL import tariffs on processed shrimp under the ACFTA on Indonesia's trade performance, revenue, welfare, and consumer surplus. We applied the Software for Market Analysis and Restrictions on Trade (SMART) within the World Integrated Trade Solution (WITS) as the method of data analysis[3].

The reason for employing the SMART modelling tool follows the large number of previous studies in the literature (see, for instance, Kumar and Ahmed 2014; Vu 2016; Thu et al. 2018; Linh et al. 2021; Chiunjira 2020; Pasara and Diko 2020; Ratisai 2014; Veeramani and Saini 2011; Mahmood et al. 2017; Mathur 2014; Othieno and Shinyekwa 2011). Mahmood et al. (2017) and Mathur (2014) used the SMART model to estimate the impact of trade liberalisation and trading performance on certain commodities in Pakistan and Ecuador. Kumar and Ahmed (2014) on the impact of the South Asia Free Trade Agreement-SAFTA, the European and Vietnam Free Trade Agreement-EVTA (Vu 2016; Thu et al. 2018; Linh et al. 2021), the African

[3] Laird and Yeats (1986) previously suggested the SMART model and its simulation. This model was then popularized among others by Vanzetti et al. (2018), UNCTAD 2022), and the World Bank (2010). The software to run this model was the World Integrated Trade Solution (WITS) software developed by the World Bank and the United Nations Conference on Trade and Development (UNCTAD 2022; Jammes and Olarreaga 2005).

Continental Free Trade Area-AfCFTA (Chiunjira 2020; Pasara and Diko 2020; Ratisai 2014; Othieno and Shinyekwa 2011), and ASEAN-India Preferential Trade Agreement (Veeramani and Saini 2011). Thus, by following this model, the results and discussion of this study can be compared to the findings of previous studies.

### SMART model

The SMART model was developed based on the economic theory of import, demand, and export supply functions. The assumptions used in building the SMART model are as follows. First, the trade elasticity of each country in the model varies significantly because each country has different production patterns and sectoral characteristics. Import demand elasticity values used by default in SMART are the same for all exporters but may vary by product. The current set includes over 100 distinct values that can be changed, but the elasticity value is unique for a given product (import demand elasticity is irrespective of the partner). The SMART model relies on the Armington assumption from the import demand side. This assumption implies that imports from different countries are imperfect substitutes. This condition helps solve difficulties involving many items.

In this study, the import demand elasticity used was 1.5 as the standard value in the SMART model. This value reflects the assumption of the responsiveness of importers in switching between different foreign sources (countries) of the same product when relative prices change, and is called Armington elasticity. Based on empirical results, the value of elasticity was quite diverse, ranging from 0.24 to 1.40 or even higher (Devarajan et al. 2023; Freeman et al. 2021; Ahmad and Riker 2020; Saito 2004), and export supply elasticity received 99 (infinite elasticity) as the default value and was the same for all partners.

The export supply is very elastic or infinite. It is based on empirical results from Tokarick (2010) and Broda et al. (2008), who estimated that the value of export elasticity in various countries varies between 1.34–11.85. Changes in these elasticities will have the following effects on the outcome: (a) the elasticity of import demand proportionally affects the change in imports, (b) the elasticity of substitution almost proportionally affects the diversion of trade among exporters, and (c) the elasticity of export supply affects the outcome by changing part of the trade creation (quantity effect) into a price effect. Maximum trade creation is achieved with an infinite elasticity of export supply (Yilmazkuday 2024; Bohlmann 2021; Fontagné et al. 2022). The SMART model in this study is estimated following Laird and Yeats (1986), and a complete derivation of the model's key equations is provided in Appendix A.

Second, the optimisation process (budgeting) goes through two stages, which ensures a strong separation between goods to produce a zero cross-price elasticity between goods and constant elasticity of substitution (CES) on the diversity of products that exist at the national level. Within the Armington assumption, the representative agent maximizes its welfare through a two-stage optimization process: (a) given a general price index, the agent chooses the total spending/consumption level on a composite good. The relationship between changes in the price index and their impact on total spending is determined by a given import demand elasticity, and (b) within this composite good, the agent allocates the chosen level of spending among the dif-

ferent varieties of the good, depending on the relative price of each variety. The Armington substitution elasticity determines the extent of the between-variety allocative response to changes in the relative price. Third, all countries face fixed world prices (Vu 2016; Othieno and Shinyekwa 2011; Lang 2006). Fourth, the SMART model does not analyse the dynamic impacts of technological and investment changes over time. Fifth, the analysis does not consider changes in global supply chains. Sixth, the impact of non-tariff barriers is beyond the remit of the SMART model. Finally, the SMART model operates within the corridor of a perfectly competitive market.

In addition, the SMART model uses a partial equilibrium (PE) framework that focuses on the direct impact of trade policy changes on specific sectors and ignores broader economic interactions, such as production-side adjustments and labour impacts. Due to their simplicity, the SMART model may neglect the important intersectoral input–output or upstream/downstream linkages that are the basis of general equilibrium analyses. It also misses the existing constraints that apply to the various factors of production (e.g., labour, capital, land) and their movement across sectors, or does not consider spillovers to other sectors or markets. The SMART model also does not look at changes in labour demand in specific sectors, wage effects, unemployment, labour mobility, and the social impacts of job losses from a surge in imports (World Bank 2010). Although this assumption is less realistic, it can be an important starting point (benchmark) or basic model and, at the same time, provides a strong analysis in understanding the basic principles of economics compared to complex but difficult to analyse models (Ogunkola and Olakojo 2021; Pasara and Diko 2020; Guei et al. 2017; Makochekanwa 2014).

The SMART model has advantages and disadvantages (World Bank 2010). The advantages of this model compared to other international trade economic models, among others, are (a) it allows to focus on one importing market and its exporting partners and facilitates the analysis of tariff change scenarios, (b) it is relatively easy to use, (c) the model works and interpretation are straightforward, as it involves a relatively limited number of equations for estimating changes in supply and demand, (d) the data required is more limited, especially in developing countries that often have many problems in collecting them, (e) it provides more detailed information to policymakers than using a general equilibrium (GE) model as it is constructed at a (very) aggregate level, and (f) it captures the impact in the short and medium term.

The disadvantages or limitations of the SMART model include (a) it is only a partial equilibrium (PE) model of the economy so the analysis is only on certain economic variables and it is strongly influenced by elasticity behaviour, (b) the simplicity of the model makes it miss the important interactions between various input/output markets so it tends to not take into account the economic interrelationships broadly, (c) various factors of production (labour capital, or land) are assumed to be static across sectors and the model operates under strict *ceteris paribus* conditions, (d) non-tariff barriers are not considered because the model only accounts for ad-valorem tariffs, and (e) it is unable to capture the long-term impact (see, for instance, World Bank 2010; Amjadi et al. 2011; Ratisai 2014). Thus, caveats apply in applying the SMART model in this study.

### Simulation scenario on SMART model

In the simulation analysis, we made two scenario analyses. In the first scenario, the government has no SL policy (defined here as a pre-SL policy) on processed shrimps. In the second scenario, the government has issued an SL policy (defined here as a post-SL policy) on processed shrimps. The data used for the simulation analysis were different in these two scenarios. In the simulation analysis of the pre-SL policy (scenario 1), the UN Comtrade data from 2002–2010 were used. For the simulation analysis in the post-SL policy (scenario 2) of processed shrimp, the 2011–2021 Comtrade data were used. Note that the commodities analysed in the simulation of the two scenarios were processed shrimp with codes HS 160520 (shrimps and prawns, prepared or preserved), 160,521 (shrimps and prawns, prepared or preserved, not in airtight containers, excl. smoked), and 160,529 (shrimps and prawns, prepared or preserved, in airtight containers, excl. smoked).

There were three simulations in scenarios 1 and 2 related to import duties or tariffs for processed shrimp to Indonesia from China and ASEAN countries. In these simulations, hypothetical tariff rates of 10%, 5%, and 0% on processed shrimp were applied. It was assumed that tariffs on other commodities remained unchanged, and markets outside the ACFTA framework were not included in the analysis. The first simulation used the selection of a 10% tariff rate that was based on a hypothetical scenario reflecting the current global trend toward increased trade protectionism. The second simulation used a tariff setting of 5% for imported processed shrimp products from China that was based on the existing tariff regulation issued by the government of Indonesia (see Finance Minister Regulation No. 46/PMK.010/22). This Ministry Regulation concerns the determination of import duty tariffs in the Framework of Approval on Trade in Goods in the ACFTA Agreement.

Finally, the third simulation was by setting the import tariff for processed shrimps at 0%. The aim is to evaluate the impact when Indonesia's processed shrimp are fully integrated into the free market or when trade liberalisation occurs in the ACFTA. Under these three simulations, the impact of import tariff rates at 10%, 5%, and 0% of Indonesian processed shrimp under ACFTA on trade, tariff revenue, welfare, and consumer surplus in Indonesia was estimated.

## Results and discussion

### Development of processed shrimp imports from ASEAN and China markets

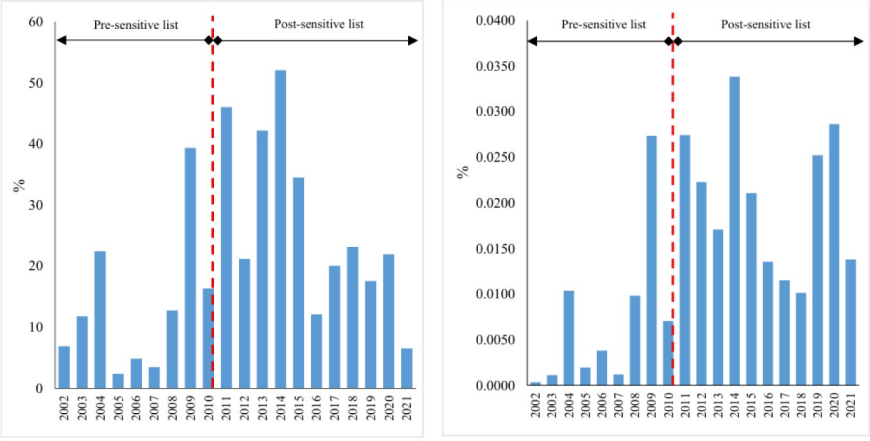
By examining the UN Comtrade statistical data 2002–2021, the results show that Indonesia has determined 349 commodity groups with 6-digit HS codes in SL and 50 commodities with 6-digit HS codes in HSL. From the list, the commodity of processed shrimp is included in SL with HS code 160,520, small and medium shrimp in HS code 160,521 version 2007, and large shrimp and other groups (e.g., shrimp meatballs and floured shrimp) in HS code 160,529 version 2012. The main consideration in including these processed shrimps in the sensitive list is to protect the development of the processed shrimp domestic industry. This industry is not considered ready to

compete in the global and regional market due to the dominance of traditional cultivation practices (Nurfitri 2015), limited technology and investment, gaps in the value chain, and logistical challenges (Rizky et al. 2020; Digantara 2015).

The agreement within the ACFTA related to tariff setting for commodities that are included in the SL differs for ASEAN-6 countries (Indonesia, Brunei Darussalam, the Philippines, Malaysia, Singapore, and Thailand) and China, and for CLMV countries (Cambodia, Laos, Myanmar, and Vietnam). For ASEAN-6 countries and China, the tariff settings for SL commodities are less than 20% before January 1, 2012, and 0–5% before January 1, 2018. While for CLMV countries, the tariff setting was less than 20% until January 1, 2015, and 0.5% before January 1, 2020. For the HSL, in particular, the import tariff setting for ASEAN 6 countries and China was less than 50% before January 1, 2015. For CLMV countries, this threshold applied until January 1, 2018 (asean.org 2021).

The tariff imposed on Indonesia is further regulated through Minister of Finance Regulation (Peraturan Menteri Keuangan, PMK) No. 235/2008, concerning the Stipulation of Import Duty Tariffs in the Framework of the ACFTA, which was later amended by PMK No. 46/2022 concerning the Stipulation of Import Duty Tariffs in the Framework of Agreements on Trade in Goods of Comprehensive Economic Cooperation between the ASEAN and the People's Republic of China (ACFTA). The import duty imposed for processed shrimp HS codes 160,520, 160,521, and 160,529 was 5% in effect from 2009 until now. Whereas other shrimp commodities under HS code 1605 (crustaceans, molluscs, and other invertebrates), including crabs, lobsters, and molluscs, are subject to a tariff of 0%.

Figure 1a shows the share of processed shrimp imports to total Indonesian shrimp and to total world shrimp classified under HS code 1605. The data show that processed shrimp have consistently made up a significant portion of overall import val-




a. Share of processed shrimp import to the total Indonesian shrimp

b. Share of processed shrimp imports to the total world shrimp

**Fig. 1** Trends of the market share of processed shrimp imports to total Indonesian shrimp and to total world shrimp, 2002–2021. Source: Authors' calculation from the UN Comtrade data 2022

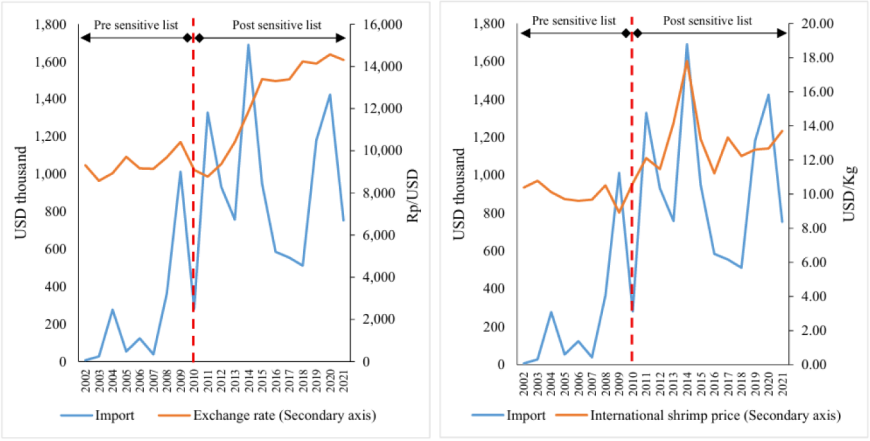
ues. The highest recorded share was in 2014, surpassing 52%, while the lowest was in 2005 at only 2.3%. Also, it can be seen that during the pre-SL policy period (2002–2010), the average share of processed shrimp imports was 13.33%, whereas during the post-SL period (2011–2021), the average share of processed shrimp imports was 27.02%, indicating a notable increase following the policy implementation.

Regarding the growth rate, the pre-SL period exhibited a positive growth rate of 13.33% per year, whereas the post-SL period showed a decrease of 16.27% per year. This suggests that SL policies have played a role in reducing imports of processed shrimp. The fluctuation in the import share of processed shrimp from 2002 to 2021 shows that there were changes in the demand for raw materials by the shrimp processing industry. This is because most of Indonesia's shrimp is exported (99.0%), in the form of frozen shrimp or frozen peeled and shell-on, with yields reaching an average of 65%. Only a few (1%) are intended to meet the domestic demands of the shrimp processing industry in Indonesia. The main reasons exporters prefer international markets to local markets are as follows: (1) the demand for the export market is relatively stable, (2) export prices are attractive, and (3) the supply of domestic shrimp commodities is still far behind chicken meat and eggs (Faqih 2021; Somamihardja 2021).

Concerning the global market trends for Indonesia's processed shrimp imports, the estimated share remains relatively low, accounting for no more than 0.035%, with the import value not exceeding USD 1.7 million. Despite its small scale, the share of imports has grown at an average annual rate of 20.75%, while the import value has increased by 26.36% per year over the past two decades (Fig. 1b). In this case, SL policy can be an essential part or a complement to bridge the end goal. During the pre-SL policy, the growing share of processed shrimp imports reached 41.11% per year, whereas in the post-SL policy, the growth decreased by 6.07% per year. This decline allows the domestic industry of processed shrimp to develop using resources, including domestic raw materials, which are more price-competitive than imported shrimp. As Indonesia has the potential to produce processed shrimp, the present low level of processed shrimp imports to the global market is a wake-up call for the government to optimize the development of domestic shrimp commodities.

In terms of the trend in the value of Indonesia's processed shrimp imports relative to the Rupiah (IDR) to the US Dollar (USD) exchange rate, imports tend to rise when the Rupiah appreciates against the USD, although this pattern was observed in only about 55% of the past two decades (Fig. 2a). The correlation between these variables is relatively weak, with a coefficient of just 0.49, indicating a modest positive relationship between the value of processed shrimp imports and the exchange rate.

Using international shrimp prices based on the Mexican shrimp market benchmark shows that imports of Indonesian processed shrimp tend to rise when international shrimp prices decline. However, in some cases, there are still anomalies where Indonesian processed shrimp imports increase when international shrimp prices increase (Fig. 2b). The correlation coefficient was 0.68. This shows that there is a moderate positive relationship between imports of processed shrimp and international shrimp prices. These findings indirectly suggest that Indonesia's processed shrimp industry is highly dependent on foreign raw materials.




a. Import value of processed shrimp and the exchange rate

b. Import value of processed shrimp and the international price of shrimp

**Fig. 2** The trend of Indonesian import values of processed shrimp by exchange rates, and international price of shrimp, 2002–2021. Source: calculated from the UN Comtrade data 2022

The average import value of processed shrimp per year before the SL policy during 2002–2010 was USD 242.89 thousand. However, after the SL policy was issued in the period 2011–2022, the import value increased almost fivefold, reaching USD 969.73 thousand. This increase was not due to the SL policy, as the tariff rate did not change over those years. Revand (2024) and Simanjuntak (2024) indicated that the cause of the significant increase in the import value after the SL policy during the period 2011–2022 was due to the increase in the growth of demand for imported shrimp products for the hotel, restaurant, café (horeca), food processing industry, and retail markets. These sectors usually consume shrimp products in the form of ready-to-eat processed products, such as frozen peeled shrimp, breaded shrimp, and other processed products. Also, it was because of the increase in the consumption of processed shrimp (together with fish) by 2.9% per year during the period 2011–2022. In addition, during these years, there was frequent appreciation of the Rupiah against the USD (63.64%) rather than the decline in international shrimp prices (27.27%). Shrimp farming in several production centres experienced a series of significant pest and disease attacks after 2010, such as Acute Hepatopancreatic Necrosis Disease (AHPND) and Enterocytozoon Hepatopenaei (EHP), which disrupted production (BadanPusat Statistik 2024).

In the case of the development of Indonesia's processed shrimp imports from the ACFTA market, the results indicate that ASEAN countries, particularly Singapore and Malaysia, dominate imports to the Indonesian processed shrimp market compared to China. However, China only imported processed shrimp to Indonesia in 2002, 2019, and 2020 (Fig. 3). This occurred because the import value of processed shrimp to Indonesia was relatively small, so importers sought other markets outside Indonesia. For example, in 2021, the value of imported Indonesian processed shrimp from the ACFTA market reached USD 373,000 or around IDR 5.41 billion (assuming an exchange rate of IDR 14,500/USD). In 2020, the data was only recorded at USD 2

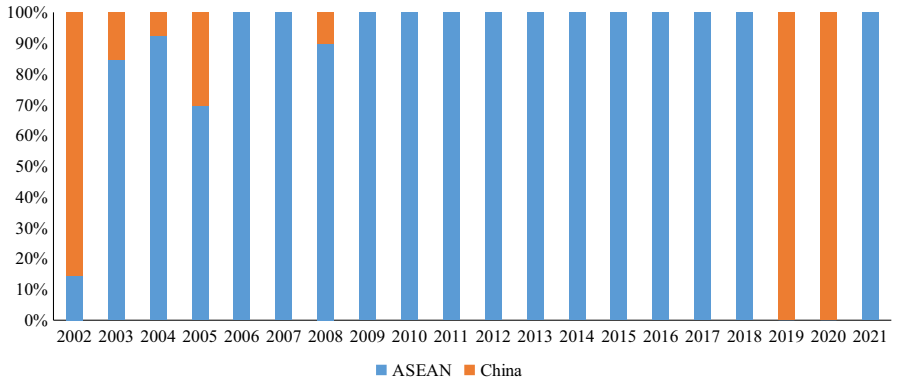
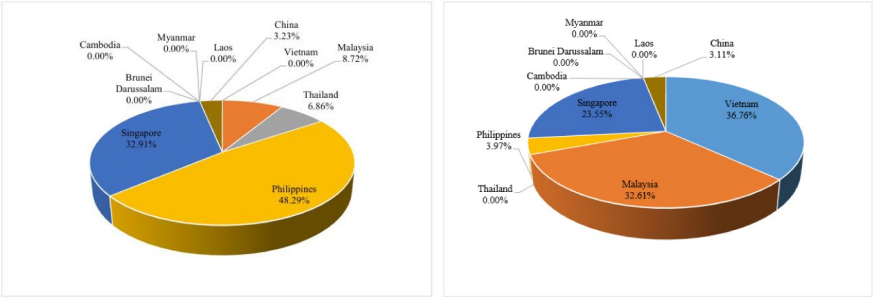



**Fig. 3** Trends of Indonesia's processed shrimp import values from ASEAN markets and China, 2002–2021. Source: calculated from the UN Comtrade data 2022




a. Pre-sensitive list from 2002 to 2010

b. Post-sensitive list from 2011 to 2021

**Fig. 4** Trends of the average import values of Indonesia's processed shrimps from ASEAN markets and China, 2002–2021. Source: calculated from the UN Comtrade data 2022

thousand or approximately IDR 29 million. The SL policy also affected the growth of Indonesia's processed shrimp imports from the ACFTA market. During pre-SL policy period, Indonesia's processed shrimp imports grew by 24.37% annually. Meanwhile, in the post-SL policy period, however, Indonesia's processed shrimp imports from the ACFTA market decreased by 19.09% per year.

Furthermore, Fig. 4a and 4b show the development of the average market share of Indonesia's processed shrimp imports from countries that are members of the ACFTA in the pre- and post-SL policy periods. In the pre-SL policy period, the Philippines became the country that dominated the imported processed shrimp market in Indonesia (48.29%), followed by Singapore (32.91%) and Malaysia (8.72%). Meanwhile, in the post-SL policy period, Vietnam succeeded in shifting to other supplying countries, with an average market share of 36.76%, followed by Malaysia at 32.61%, and Singapore at 23.55%. This indicates that the existence of the SL policy has changed the constellation of suppliers of Indonesia's processed shrimp commodities from ACFTA countries.

### Impact of sensitive list import tariffs on shrimps on trade

By employing the SMART model analysis, the results show that during the pre-and post-SL policy periods, the impact of import tariffs under simulations 01 and 02 reduced the change in the value of Indonesia's processed shrimp imports. In Simulation 01, for example, the imposition of a 10% tariff reduced the change in import value of Indonesia's processed shrimp by USD 14.90 thousand during the pre-SL policy scenario, while during the post-SL policy scenario, the change in import value of processed shrimp decreased by USD 1.10 thousand. The same pattern also occurs when the tariff is imposed at 5% (Simulation 02). The change in the import value of Indonesia's processed shrimp decreased by USD 14.90 thousand during the pre-SL policy and by USD 0.04 thousand during the post-SL policy (Table 1). These results highlighted that the tariff policy affected the price increase of processed shrimp imports in Indonesia.

Under Simulation 03, the imposition of a 0% tariff was positive. The change in import value of processed shrimp products amounted to USD 5.98 thousand during the pre-SL policy and USD 1.04 thousand during the post-SL policy (Table 1). These results indirectly indicate that the competitiveness of Indonesian processed shrimp is lower than that of other countries. The situation is the opposite when discussing fresh shrimp (fresh and frozen), where the competitiveness of this commodity is good enough in the international market (Kusuma and Sari 2021; Yusuf et al. 2021; Dimantara and Elida 2020; Yaman 2017). Removing tariffs alone would likely increase imports, suggesting a structural competitiveness gap in the domestic processed shrimp industry.

To address these challenges, the Indonesian government has introduced a range of strategic policies regarding processed shrimp imports to balance industrial demand, domestic sector protection, and international commitments. Upstream policies include the restriction of shrimp species imports such as *Penaeus vannamei* through key regulations: Minister of Trade Regulation No. 64/2009, No. 64/2019 (amending No. 66/2018), and No. 3/2024 (amending No. 36/2023). These measures aim to safeguard domestic aquaculture and prevent invasive species. Additionally, initiatives to

**Table 1** The results of the simulation on the impacts of import tariffs of the pre- and post-sensitive list policy of processed shrimp on the value of processed shrimp imported to Indonesia

| Simulation (Sim) | Pre-sensitive list policy | | Post-sensitive list policy | |
|---|---|---|---|---|
| | Initial import (USD 000) | Import changes (USD 000) | Initial import (USD 000) | Import changes (USD 000) |
| Sim 01 | 36.03 | − 14.90 | 1,423.74 | − 1.10 |
| Sim 02 | 36.03 | − 14.90 | 1,423.74 | − 0.04 |
| Sim 03 | 36.03 | 5.98 | 1,423.74 | 1.04 |

Notes: Sim 01: Imposing an import tariff on processed shrimp products by 10%. Sim 02: Imposing an import tariff on processed shrimp products by 5%. Sim 03: Imposing an import tariff on processed shrimp products by 0%

Source: WITS 2022 (estimated)

support shrimp feed production, like modern shrimp estates in Central Kalimantan and Sumbawa (West Nusa Tenggara), are in place.

Regarding downstream policies, the government restricts processed shrimp imports to those not sufficiently produced domestically and required by the Horeca or processing sectors, governed by Presidential Regulation No. 61/2024, Ministerial Regulations No. 14/2024, No. 20/2021, and Government Regulation No. 09/2018. To enforce food safety and product quality, several non-tariff measures (NTMs) are implemented, such as Regulation No. 8/2024, Regulation No. 17/2019, Regulation No. 17/2021, and Hazard Analysis and Critical Control Points (HACCP)-based Regulation No. 51/2018.

Furthermore, Indonesia integrates the import process into the Indonesia National Single Window (INSW) and the National Logistics Ecosystem (NLE), while export diversification is pursued through the Ministry of Marine Affairs and Fisheries, targeting markets such as China, Japan, Australia, and South Korea, estimated at USD 800 million (kkp.go.id 2024). Fiscal support includes subsidized fertilizer (Presidential Regulation No. 6/2025) and People's Business Credit (KUR) under Coordinating Minister Regulation No. 15/2020.

These initiatives are aligned with the 2025–2029 National Medium-Term Development Plan (RPJMN), which positions the blue economy, particularly shrimp, as a key growth driver in maritime regions such as Maluku, Papua, and East Kalimantan. Several major processors, both private and state-owned (e.g., PT Mijasa Mitra, PT Bumi Menara Internusa, PT Bahari Makmur Sejati, PT Seafood Laut Pertama, and PT Perikanan Indonesia), have helped expand product offerings such as Head-On Shell-On (HOSO), shrimp rings, and cooked variants.

Thus, even though tariff protection under the SL helps reduce competition from imports, the results from the SMART model suggest that deeper structural improvements are still required. This finding indicates that when trade liberalisation of processed shrimp takes place under the ACFTA, the demand for processed shrimp in the domestic market tends to be fulfilled by imports. It underscores the importance of strengthening the downstream shrimp industry to support value-added processing, which is recognized for its higher contribution to labour absorption (Runtukahu 2021) and sustainable resource use (Syahrin et al. 2016) compared to fresh shrimp exports. Despite various policy efforts, the industry still faces structural limitations that constrain its ability to respond competitively to increased trade openness (Manalu 2019; Karunia 2023; Nurfitri 2015).

The results of the import tariff impact of the SL policy on the change in the export value of processed shrimp from ASEAN and China are presented in Table 2. As can be seen from this Table, under simulations 01, 02, and 03, the change of processed shrimp export value originating from ASEAN countries experienced a decrease in the pre-SL policy scenario. The reduction in the change of processed shrimp export value from ASEAN also occurred in simulations 01 and 02 in the post-SL policy scenario. However, under Simulation 03 in the post-SL policy scenario, there is no reduction in the value of processed shrimp exported from ASEAN. The reduction in the change of processed shrimp export value from ASEAN may be partly due to the competitiveness of processed shrimp exports from ASEAN compared to other countries (Kusuma and Sari 2021; Yusuf et al. 2021; Dimantara and Elida 2020; Yaman 2017).

**Table 2** Impact of import tariffs of the sensitive list policy of Indonesia's processed shrimp export from ASEAN and China

| Simulation (Sim) | Region/ Country | Pre-sensitive list policy | | | Post-sensitive list policy | | |
|---|---|---|---|---|---|---|---|
| | | Initial export (USD 000) | Final export (USD 000) | Export change (USD 000) | Initial export (USD 000) | Final export (USD 000) | Export change (000 USD) |
| Sim 01 | ASEAN | 23.219 | 7.711 | − 15.508 | 0.055 | 0.000 | −0.055 |
| | China | 9.781 | 10.241 | 0.460 | 1.701 | 0.539 | −1.163 |
| Sim 02 | ASEAN | 23.219 | 7.711 | − 15.508 | 0.055 | 0.016 | −0.039 |
| | China | 9.781 | 10.241 | 0.460 | 1.701 | 1.701 | 0.000 |
| Sim 03 | ASEAN | 23.219 | 22.761 | − 0.458 | 0.055 | 0.055 | 0.000 |
| | China | 9.781 | 16.278 | 6.497 | 1.701 | 2.862 | 1.161 |

Notes: Sim 01: Imposing an import tariff on processed shrimp products by 10%. Sim 02: Imposing an import tariff on processed shrimp products by 5%. Sim 03: Imposing an import tariff on processed shrimp products by 0%.

Source: WITS 2022 (estimated).

The decrease in exports from ASEAN countries and China to Indonesia suggests that Indonesia's SL policy affects their export performance. Stricter regulations on Indonesian processed shrimp contribute to a contraction in their exports. In response, major shrimp-exporting nations in the ASEAN region have started to promote the development of their domestic shrimp processing industries, either as stand-alone initiatives or as part of broader agri-food policies. Typically, the shrimp products processed in factories consist mainly of headless and peeled shrimp, which comprise approximately 88.5%. Processing generates by-products that require appropriate handling (Thamrin et al. 2025).

For instance, Singapore has introduced the "30 by 30" vision, an initiative by the Singapore Food Agency (SFA) to increase local production to meet 30% of the country's nutritional needs by 2030. Although current local production accounts for less than 10%, the SFA is actively collaborating with the agri-food sector to enhance productivity in a sustainable, resource-efficient, and climate-resilient manner (mse.gov.sg 2024; lkyspp.nus.edu.sg (n.d), xxxx). Meanwhile, Malaysia's shrimp processing industry is expanding rapidly, driven by growing domestic consumption and export opportunities. Projections indicate continued growth through 2033, supported by consumer demand for convenient, ready-to-cook, and frozen shrimp products and innovations in shrimp farming and processing technologies (research.com 2021). Vietnam's processed shrimp sector is also experiencing notable growth, propelled by rising international demand, favourable local conditions for shrimp farming, government support, and beneficial trade agreements. Contributing factors include increased seafood consumption, sustainable aquaculture practices, and shifting consumer preferences (the-shiv.com 2025).

In contrast to ASEAN, China experiences positive gains in export value across all simulations under the pre-SL policy scenario. However, in Simulation 01 of the post-SL policy scenario, China's export value of processed shrimp declined by USD 1.163 thousand. Positive outcomes for China reappear in Simulation 03 of the post-SL scenario. These benefits can be partly attributed to factors such as China's anti-

dumping policies and labour cost advantages. Additionally, re-export activities often accompany increased imports of marine products (Crona et al. 2020).

These findings highlight two key insights. First, strong competitiveness in processed shrimp products tends to be associated with greater trade benefits when trade barriers are lowered or removed. Second, trade liberalisation under the ACFTA framework generally leads to improved outcomes for participating countries. Nevertheless, the gains are not uniformly distributed. For instance, the ASEAN-India Free Trade Agreement (AIFTA) has produced varied effects, benefiting both member and non-member countries differently, with distinct implications for India's trade flows (Kumari 2025). Similarly, Ahmed (2010), using general and partial equilibrium models, found that an influx of ASEAN exports in processed food, agriculture, and fisheries could potentially harm employment and wage levels among India's working class.

Likewise, under the EU-ACP Economic Partnership Agreements (EPAs), ACP countries are required to commit to substantial tariff reductions on EU imports, while the EU offers greater market access for ACP exports (Morrissey 2005, 2010). For ACP countries, this arrangement may lead to increased imports from the EU, loss of tariff revenue, and intensified competition in domestic and regional markets, posing significant adjustment costs, although some of these may be offset by enhanced export opportunities to the EU (Morrissey 2010).

Table 3 shows the results of the SL import tariffs of processed shrimp commodities on trade creation and diversion values in ASEAN and China. The reduction in the values of trade creation in ASEAN occurred under simulations 01 and 02 in both the pre- and post-SL policy scenarios. Through the implementation of the SL policy, which raises import tariffs, Indonesia effectively restricts market access for processed shrimp products from ASEAN in both simulations 01 and 02. Consequently, ACFTA fails to promote trade creation for these products, leading to a decline in imports from ASEAN countries. In China, the positive trade creation only occurs in simulation 01 under the post-SL policy scenario. According to Tian et al. (2024), although there are no tariff preferences, China still offers competitive prices and volumes to compete and increase its exports to Indonesia.

**Table 3** Impacts of the import tariff of the sensitive list policy of Indonesia on processed shrimp on trade creation and diversion in ASEAN and China

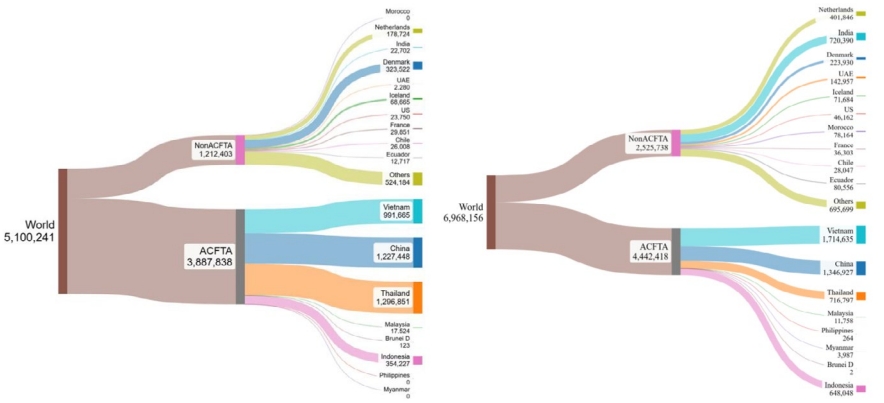
| Simulation (Sim) | Region/ Country | Pre-sensitive list policy | | Post-sensitive list policy | |
|---|---|---|---|---|---|
| | | Trade creation (USD 000) | Trade diversion (USD 000) | Trade creation (USD 000) | Trade diversion (USD 000) |
| Sim 01 | ASEAN | − 14.904 | − 0.604 | − 0.055 | 0.000 |
| | China | 0.000 | 0.460 | − 1.040 | − 0.123 |
| Sim 02 | ASEAN | − 14.904 | − 0.604 | − 0.036 | − 0.004 |
| | China | 0.000 | 0.460 | 0.000 | 0.000 |
| Sim 03 | ASEAN | 0.000 | − 0.458 | 0.000 | 0.000 |
| | China | 5.979 | 0.517 | 1.040 | 0.121 |

Notes: Sim 01: Imposing an import tariff on processed shrimp products by 10% Sim 02: Imposing an import tariff on processed shrimp products by 5%. Sim 03: Imposing an import tariff on processed shrimp products by 0%

Source: WITS 2022 (estimated)

With trade diversion, all simulations under the pre-SL policy scenario show a decrease in trade diversion within ASEAN. In the post-SL policy scenario, ASEAN's trade diversion value decreased only in Simulation 02. In contrast, the pattern observed for China is different in that a reduction in trade diversion value occurred solely in Simulation 01 under the post-SL policy scenario. This implies that no trade diversion occurs in other countries that could replace the sources of processed shrimp imports to Indonesia, which are now subject to high tariffs. The total import volume may decline because Indonesia fails to substitute old suppliers with new ones or reduce overall imports. The growing domestic production of processed shrimp could drive a decrease in imports. Furthermore, there are signs that when import tariffs on processed shrimp were raised, Indonesia shifted to importing more processed shrimp from ASEAN countries, such as Vietnam and Thailand, rather than from China, despite China's potential for greater efficiency. As noted by Putri (2024) and Tampubolon (2020), ASEAN countries continue to serve as key suppliers for Indonesia, despite China's dominant position in bilateral trade.

Regarding trade diversion, introducing higher tariffs (10%) exacerbated trade diversion solely in China's case. When Indonesia included processed shrimp in the SL policy, trade liberalisation did not fully extend to China, even though both countries are part of the ACFTA. The negative trade diversion value for China suggests it is not the main alternative for non-ACFTA countries seeking to export processed shrimp to Indonesia, with ASEAN nations taking on that role instead. It underscores the SL's effectiveness as a protective tool and demonstrates how partial liberalisation can lead to uneven effects among trade partners. These outcomes are consistent with prior research by Mahdi and Suharno (2021), which found evidence of trade creation in the horticulture sector under ACFTA while examining different agricultural commodities. Eliminating tariffs to 0% boosted the trade value of Indonesia's horticultural exports among ACFTA members. On the other hand, Dewi and Sahara (2019)




a. 2013 b. 2022

**Fig. 5** Trends of the export values of processed shrimp worldwide, 2013–2022. Source: calculated from the UN Comtrade data 2022

argued that Indonesia experienced trade diversion losses from non-member countries to ACFTA+3 countries due to the agreement.

Figure 5 illustrates the growth of processed shrimp exports in the global market between 2013 and 2022. Between 64 and 76% of the share of processed shrimp exports was dominated by ACFTA countries, with the remainder distributed among other countries or regions. Following the implementation of Indonesia's SL policy, which led to trade diversion, Indonesia can shift its suppliers from non-ACFTA countries, such as India, the Netherlands, and Denmark. Through agreements like the European Union-Comprehensive Economic Partnership Agreement (EU-CEPA) and the ASEAN–India Free Trade Agreement (AIFTA), Indonesia can gain access to the processed shrimp market and/or explore alternative import suppliers.

If the simulation is conducted under a scenario of complete trade liberalisation, China would gain the most benefits. China would profit significantly from the full trade liberalisation of the processed shrimp trade among Indonesia and ASEAN countries under the ACFTA framework. China has clear competitive advantages and is well-established in the shrimp food industry. Advances in aquaculture technology and strong government support have improved the efficiency and sustainability of shrimp farming. For instance, China has developed effective shrimp farming technologies, such as Recirculating Aquaculture Systems (RAS), which help manage air quality and boost productivity. Many shrimp farms in China are located indoors with strict quality control measures, ensuring optimal yields. Furthermore, China's ability to adapt to market trends, such as promoting convenient and ready-to-eat shrimp products, further enhances its competitive advantage (N'Souvi et al. 2024; Vanessa 2024).

China holds several strategic benefits in scenarios of trade liberalisation, enhancing its role as a leading global economic power. China had a unique combination of scale, infrastructure, and export performance, global trade and policy adaptability, and economic reforms that positioned it to disproportionately benefit from trade liberalisation (Hu et al. 2022; Ing et al. 2021; Aichele and Heiland 2018). Moreover, China has a distinctive dual trade system where certain imports of intermediate goods are taxed, while others are not. This arrangement enables regular importers to enhance their competitiveness compared to processing firms, which need to modify their strategies to cope with heightened competition (Bas and Strauss-Kahn 2024). This strategy aims to bolster economic resilience, foster technological innovation, and sustain China's pivotal position in global trade.

Table 4 highlights China's structural advantages over Vietnam, Indonesia, and Thailand in navigating the full liberalisation of processed shrimp under ACFTA. With the highest production volumes at about 2.2 million tons in 2023, advanced farming systems (including recirculating aquaculture systems–RAS, biofloc, and IoT-based monitoring), robust cold chain logistics, and diversified product lines, China is strategically positioned to expand its processed shrimp exports. These capabilities reflect export readiness and internal industrial maturity, allowing China to scale rapidly as trade barriers fall.

In addition, its large domestic food and beverage (F and B) market, valued at USD 1.7 trillion in 2024, fuels consistent downstream demand for processed shrimp. It reinforces the cycle between upstream aquaculture and downstream processing

**Table 4** Shrimp sector readiness comparison in China, Vietnam, Indonesia, and Thailand

| Aspect | China | Vietnam | Indonesia | Thailand |
|---|---|---|---|---|
| Total shrimp aquaculture production (ton) | 2,100,000[a] (2022) 2,240,000[b] (2023) | 723,000[c] (2023) 792,000[d] (2024) | 310,000–320,000[c] (2023) 492,100[d] (2024) | 256,832[c] (2023) 303,00[d] (2024) |
| Vannamei production (ton) | 1,890,000[a] (2023) | 570,000[a] (2023) | 265,000–275,000[a] (2023) | 241,526[a] (2023) |
| Cost of production 50 pcs/kg (USD/kg) | 3.5–5.0*[d] | 3.5–4.2[e] | 2.5–3.5[e] | 3.7–4.5[e] |
| Farm-gate price (Vannamei) (USD/kg) | 4.13[f] (June 2024) | 5.93[c] (Jan 2024)[a] | 4.42[c] (May 2024) | 4.63[c] (Jan-Des 2023) |
| Capacity and scalability | Large-scale, intensive, highly modernized | Rapid growth in intensive farming | Installed capacity underutilized (60–65%) (Manalu 2019) | Rapid growth in intensive farming |
| Technology and innovation | Advanced: RAS, biofloc, IoT, integrated systems | Improving | Mostly traditional ponds; limited tech adoption | Improving, including various hatchery |
| Port infrastructure | Efficient export-oriented ports (e.g., Zhanjiang, Shanghai) | Active export ports (e.g., Cat Lai, Hai Phong) | Fragmented, inefficient outside Java Island | Active export ports (e.g., Laem Chabang) |
| Cold chain and logistics | Strong national cold chain; public and private investment | Developing the national cold chain | Weak the national cold chain; improving through NLE, INSW (KKP 2024) | Developing the national cold chain |
| Product diversification | Highly diversified: ready-to-eat, ebi, HOSO, cooked shrimp | Increasing variety | Mainly HOSO and frozen shrimp | Increasing variety |
| Financing and subsidies program | Strong ecosystem: soft loans, export subsidies, tax incentives | Industrial credit support varies by country | Limited: fertilizer subsidies, KUR loans (Perpres 6/2025) | Industrial credit support varies by country |
| Position in the global market | Major exporter and importer; access to the US, EU, East Asia | Strong exporters to China, Japan, US | Strong to the US but hit by Anti-Dumping (AD) and Countervailing Duties (CVD); weak in China | Strong exporters to China, Japan, US |
| Food and beverage market (USD) | 1,700 billion[g] (2024) | 23.6 billion[h] (2024) | 109.9 billion[h] (2024) | 34 billion[h] (2024) |

Note: *Average production costs are based on farming system types and not specifically calculated for 50 pcs/kg size. According to Cao (2012), shrimp production costs in China range from USD 1.05 (under extensive systems) to USD 5.00 (using recirculating aquaculture systems–RAS)

Sources:[a]USDA 2024; [b]USDA 2025; [c]Merican 2025; [d]shrimpinsights.com 2023; [e]Tansakul 2025; [f]Nguyen 2024; [g]cognitivemarketresearch.com 2024; [h]sourceofasia.com 2024

and consumption, strengthening China's integrated shrimp value chain. In contrast, despite a moderately large F and B market valued at USD 109.9 billion, Indonesia continues to face constraints in technology adoption, underutilized processing capacity, and fragmented logistics. These structural gaps align with Ling et al. (1999), who found that China and Thailand had lower domestic resource costs (DRCs), signalling higher production efficiency. As tariff barriers are removed, structurally prepared

economies like China are poised to benefit disproportionately through export expansion and robust domestic value chains. Without internal reforms, countries like Indonesia risk slower export growth and greater exposure to import surges and welfare losses despite improved market access.

### Impacts of import tariffs on processed shrimp on revenues, welfare, and consumer surplus

Table 5 summarises the effects of implementing the SL policy on import tariffs for shrimp under the ACFTA framework, focusing on Indonesia's revenue and welfare outcomes using the SMART model. As illustrated in the table, tariff revenue is strongly influenced by the tariff rate, import prices, and the volume of processed shrimp imports. In Simulations 01 and 02, government tariff revenues rose under the post-SL policy, consistent with the trend observed during the pre-SL period. However, in the post-SL scenario, raising the tariff rate to 10% does not result in additional revenue gains.

The condition may not follow the traditional theory, where the imposition of higher tariffs reduces Indonesian tariff revenues. It depends on whether higher tariffs can reduce import volume and government tariff revenues. In addition, increasing tariffs will increase domestic goods' prices, negatively impacting consumers and reducing their purchasing power. The result is a reduction in revenue from domestic consumption taxes if there is no proper adjustment. In addition, the imposition of tariffs has an optimal rate that produces maximum tax revenue, which the Laffer curve can describe (Keen and Ligthart 2002; Chiang 2002; Irwin 1998; Brecher and Alejandro 1977).

In Simulation 03, trade liberalisation or abolishing tariffs on processed shrimp reduced Indonesia's tariff revenue. This situation is consistent with the findings of Kumar and Ahmed (2014), who observed that tariff elimination negatively impacted tariff revenue. The decline in tariff revenue was more pronounced after the implementation of the Sensitive List (SL) policy compared to the period before it. This occurred primarily because, before 2010 Indonesia imposed relatively high and variable import tariffs on processed shrimp, ranging from 5 to 20%, (b) the Rupiah exchange rate against the USD was relatively more stable in the pre-sensitive list

**Table 5** Impacts of the import tariff of the sensitive list policy of processed shrimp on revenue

| Simulation (Sim) | Pre-sensitive list policy | | | Post-sensitive list policy | | |
|---|---|---|---|---|---|---|
| | Initial tariff revenue (USD 000) | New tariff revenue (USD 000) | Change in tariff revenue (USD 000) | Initial tariff revenue (USD 000) | New tariff revenue (USD 000) | Change in tariff revenue (USD 000) |
| Sim 01 | 0.64 | 1.056 | 0.416 | 38.04 | 37.958 | − 0.082 |
| Sim 02 | 0.64 | 1.056 | 0.416 | 38.04 | 38.041 | 0.001 |
| Sim 03 | 0.64 | 0.149 | − 0.492 | 38.04 | 37.896 | − 0.144 |

Notes: Sim 01: Imposing an import tariff on processed shrimp products by 10%. Sim 02: Imposing an import tariff on processed shrimp products by 5%. Sim 03: Imposing an import tariff on processed shrimp products by 0%

Source: WITS, 2022 (estimated)

**Table 6** Impact of import tariffs on sensitive list policy on processed shrimp on welfare and consumer surplus

| Simulation (Sim) | Pre-sensitive list policy | | Post-sensitive list policy | |
|---|---|---|---|---|
| | People's welfare (USD 000) | Consumer surplus (USD 000) | People's welfare (USD 000) | Consumer surplus (USD 000) |
| Sim 01 | − 0.505 | − 0.505 | − 0.004 | − 0.029 |
| Sim 02 | − 0.505 | − 0.505 | 0.000 | − 0.001 |
| Sim 03 | 0.064 | 0.064 | 0.003 | 0.028 |

Notes: Sim 01: Imposing an import tariff on processed shrimp products by 10% Sim 02: Imposing an import tariff on processed shrimp products by 5%. Sim 03: Imposing an import tariff on processed shrimp products by 0%

Source: WITS, 2022 (estimated)

period compared to the post-sensitive list period, (c) the import value of Indonesia's processed shrimp increased drastically in the post-SL policy period. But the fluctuation in the value was lower than that of the pre-SL policy. The volatility of import value in the post-SL policy was 40.22%, whereas in the pre-SL policy, it was 130.41%, respectively, and (d) the price of international shrimp during the pre-SL policy period was lower than that during the post-SL policy period.

Table 6 summarizes the impact of processed shrimp import duties in ACFTA on public welfare and consumer surplus in Indonesia. The consumer surplus is defined as the difference between the consumer's willingness to pay (marginal value) and the actual amount paid. A whole gain from reducing the tariff from t0 (before imposing the tariff) to t1 (after imposing the tariff) is called people's welfare. The results of the SMART model show that simulations 01 and 02 in imposing processed shrimp import duties will worsen consumer welfare and surplus, both before and after the SL policy. A 10% increase in tariffs will reduce consumer welfare and surplus. The increase in processed shrimp import duties is predicted to drive domestic prices so that the prices charged to consumers will also increase. The price increase of processed shrimp causes the community's consumption amount of processed shrimp to decrease. According to Kumar and Ahmed (2014), the sensitive lists policy protects local producers but at a cost to consumers. This finding confirms the results of the studies of Asche et al. (2022) and Chiang (2005), where the reduction in import tariffs can impact the decline in the price of domestic shrimp products due to competition with cheaper imported products. It stimulates a decrease in the income of local producers, an increase in the consumption of local consumers, and an increase in people's welfare.

Simulation 03 shows that trade liberalisation under the ACFTA has a positive impact on people's welfare and the surplus of processed shrimp consumers in Indonesia. The abolition of tariffs for processed shrimp by the Government of Indonesia will make import prices more competitive, so that the domestic prices faced by the community will also become more affordable. This finding aligns with the results estimated by Oktaviani and Widyastutik (2010), in which one of the objectives of establishing the ACFTA trade area was to achieve greater prosperity for its member countries.

In all simulations, for both pre- and post-SL policies, the amount of consumer surplus tends to be smaller than that of welfare. The consumer surplus, which is net

of public welfare due to tariff changes, tends to decrease with the decrease in imports due to increased tariffs. Likewise, the consumer surplus tends to increase in line with increased imports because of lower tariffs. The largest consumer surplus is achieved in the ACFTA market when trade liberalisation occurs.

The analysis of Indonesia's Sensitive List (SL) policy within the ACFTA framework indicates that the policy has not delivered the intended welfare improvements. While Free Trade Agreements (FTAs) in various regions have the potential to enhance economic and social welfare through expanded trade and improved market access, their benefits are often less substantial than those derived from broader multilateral trade liberalisation efforts (Brown et al. 2003). For instance, FTAs involving Japan, the EU, and the US have opened up new market opportunities for themselves and partner countries. These agreements have yielded economic gains for Japan and the EU, reflected in increased GDP and welfare levels. In the case of the US, significant benefits, particularly in recapturing export market share in Pacific Island nations, were anticipated when Japan reduced tariffs on specific sectors relevant to US exports (Biyik 2021). Similarly, under the India-ASEAN Free Trade Agreement (IAFTA), India and ASEAN countries experienced welfare gains, although India saw a decline in its terms of trade. Ahmed (2010) further notes that sectors such as processed foods, cereals, textiles and apparel, and light and heavy manufacturing are projected to be impacted in varying degrees.

According to Vollmer et al. (2009), who analysed the impact of the European Union-African, Caribbean and Pacific (EU-ACP) Economic Partnership Agreement, the results showed that Botswana, Cameroon, Mozambique, and Namibia are expected to benefit substantially from the interim agreements. In contrast, the trade impacts for Côte d'Ivoire, Ghana, Kenya, Tanzania, and Uganda appear minimal. Nevertheless, Tanzania and Uganda still hold the potential for positive welfare gains. However, the projected outcomes based on the interim agreement's tariff reduction levels do not fully realize the benefits that could be achieved under complete liberalisation (Vollmer et al. 2009).

## Conclusions and policy implications

### Conclusions

This study primarily examined the impact of import tariffs imposed under the ACFTA corridor sensitive list (SL) for processed shrimp on trade, tariff revenue, welfare, and consumer surplus in Indonesia. Various important insights were revealed with the assistance of the SMART model and WITS data from the period before and after the sensitive list policy was applied. Indonesia is a leading shrimp exporter in the world, including processed shrimp. The SL for processed shrimp is a government strategy to allow the Indonesian processed shrimp industry to move, grow, and develop. The resulting development of the shrimp industry stimulates an increase in the added value of exported shrimp products, thereby driving economic growth.

The results of this study, however, revealed a contrasting situation. Processed shrimp imports have fluctuated and tended to increase. The average import value

was relatively higher post-SL policy during the last decade. This trend suggests that Indonesian processed shrimp may lack competitiveness in the ACFTA market.

This finding aligns with the results of the SMART model analysis, where the SL policy of imposing tariffs on processed shrimp has the potential to limit imports to Indonesia. The simulation scenario of imposing import tariffs on processed shrimp negatively impacts trade creation and trade diversion for Indonesia and other ASEAN countries, but not for China. This may suggest that the ACFTA agreement has not offered sufficient incentives for Indonesia's processed shrimp sector to boost trade with FTA and non-FTA partners. Furthermore, imposing increasingly restrictive import tariffs on processed shrimp reduces state revenue from tariffs. With the imposition of tariffs, the SL policy also has optimum conditions that need to be considered so that it does not become a boomerang and a disincentive for Indonesian processed shrimp importers, who may divert their suppliers from outside the ACFTA market.

Finally, the impact of the SL policy, which imposes import tariffs, confirms the theory and most of the empirical results, where a more open trade policy or even trade liberalisation improves people's welfare and consumer surplus. The SL policy, which involves progressively higher tariffs, ultimately diminishes consumer surplus due to the rising prices of processed shrimp. At the same time, this situation discourages processed shrimp producers from increasing production, particularly when domestic raw shrimp is primarily allocated to household consumption and export markets rather than the manufacturing industry. In this case, China will gain the most significant benefits compared to Indonesia and other ASEAN countries if the processed shrimp trade is carried out with full trade liberalisation. China, known for its large-scale shrimp production, competes with Thailand and other major Asian producers in the ACFTA market.

## Policy implications and limitations of the study

The policy implications of this study are as follows. First, while import tariffs on processed shrimp under the ACFTA's Sensitive List (SL) serve as a key protective tool, Indonesia must reduce reliance on imported raw shrimp by strengthening domestic aquaculture. It includes revitalizing shrimp ponds through the National Strategic Project (PSN), scaling up Kampung Nelayan Merah Putih (KNMP), and improving biosecurity. Accelerating the adoption of Indonesian Good Aquaculture Practice (IndoGAP) through compliance-based incentives, such as priority access to subsidies or formal markets, is essential for building a resilient supply chain under trade liberalisation.

Second, the government should conduct a periodic and evidence-based review of the inclusion of processed shrimp in the SL. As revealed in the simulation results, this review must be guided by indicators such as declining trade creation effects, weak export performance, and limited fiscal contributions. Such a mechanism ensures that SL designations align with national competitiveness goals and trade policy effectiveness.

Third, the simulation reveals that moderate tariffs (10% and 5%) increase import prices and reduce ASEAN exports, while liberalisation does not significantly diminish export values. Highly competitive sectors like processed shrimp stand to benefit

from gradual liberalisation. Therefore, phased tariff reductions should be paired with investment incentives, technological upgrading, and export facilitation to maintain regional competitiveness.

Fourth, the observed decline in trade creation and diversion within ASEAN and China implies that current SL tariffs may hinder deeper regional integration. To address this, the government should enhance competitiveness through targeted programs: investment in cold chain logistics (as mandated by Presidential Regulation No. 3/2017), technology upgrades in partnership with international institutions, small and medium enterprises (SME) capacity-building for integration into value chains, and fiscal mechanisms that align SL tariffs with market dynamics.

Fifth, since higher tariffs do not proportionally boost state revenues, policymakers should explore a better policy mix. It includes balancing tariffs with targeted non-tariff measures (e.g., quality standards or licensing schemes) to protect domestic industries while minimizing consumer price burdens.

Finally, the complete liberalisation scenario shows substantial welfare and consumer surplus gains, affirming that SL measures should remain transitional. To secure Indonesia's position within an evolving ACFTA landscape, structural policies, including human capital development, Research and Development (R and D) support, export promotion programs, and active regional trade diplomacy, should support long-term readiness.

This study has several limitations. First, it relies on a partial equilibrium model that focuses solely on tariff policies without incorporating other influential variables, such as exchange rates, interest rates, quotas, export taxes, subsidies, global commodity prices, labour wages, or technological changes. This study did not explicitly model external shocks, such as geopolitical tensions, oil price fluctuations, or the COVID-19 pandemic. However, the impacts of these shocks may be indirectly reflected in historical trade patterns, as observed through changes in export and import values. Second, the SMART model used in this study depends on WITS data, which is limited to trade flows and tariffs at the country or regional level. As a result, the model does not reflect subnational dynamics, where the effects of trade policy can be more pronounced and heterogeneous.

Future research should explore micro-level analyses, such as at the provincial, household, or firm level, to better understand how economic agents respond to SL-related trade policies. This would offer richer insights into resource reallocation decisions and local-level impacts. Moreover, beyond processed shrimp, Indonesia places numerous other commodities in the SL and HSL categories of ACFTA, covering fisheries, agriculture, and industry. These offer valuable opportunities for comparative analysis using a similar modelling approach. Future studies could also examine SL/HSL commodities across different FTAs for broader policy relevance.

On the methodological front, general equilibrium models present a promising avenue to capture the complex interlinkages between trade and macroeconomic variables. However, applying such models requires extensive data, reliable elasticity estimates, and clearly defined inter-variable relationships, which pose challenges for implementation.

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