



Supporting the Competitiveness of Indonesian Frozen Cephalopod Commodities in Sustainable Trade in the China Market: A Factor Gap Analysis Approach

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ARTICLE INFO

Article History:

Received: Aug. 20, 2024

Accepted: Oct. 6, 2024

Online: Oct. 30, 2024

Keywords:

GAP analysis,
Competitiveness,
Cephalopods,
Sustainable trade

ABSTRACT

The level of conformity of factors supporting the competitiveness affects cephalopod trade competition in the market. The purpose of the study was to analyze the level of conformity of factors supporting the competitiveness of the Indonesian frozen cephalopods and to identify the steps necessary for improvement efforts. Factors supporting competitiveness based on Potters diamond diagram include basic conditions of natural resources, demand conditions, industrialization, product strategy, market opportunities and the role of government. The research employed GAP analysis method which aimed to determine the level of conformity of factors supporting the competitiveness of frozen cephalopods in the Chinese market. The result of the analysis showed a difference between expectations and realization in the application of factors supporting competitiveness. Key factors to maintain include the demand for frozen cephalopods in the Chinese market. Factors requiring improvement encompass industrialization, product strategy, government involvement, market opportunities, and natural resource management. The results of this study underscore the importance of Indonesian government policies in implementing SDG 14 (Life Below Water), specifically by enhancing the economic benefits of sustainably using marine resources.

INTRODUCTION

A country would obtain an absolute advantage if the country has been able to produce goods or services that other countries are not able to produce (Stojkoski *et al.*, 2016; Saptanto, 2017). While, a country would possess a comparative advantage if it can produce goods and services efficiently and cheaper when compared to other countries (Rahmansyah *et al.*, 2021; Tian *et al.*, 2024). The positive impact of the commodity trading activities globally includes increasing the prosperity of both exporting and importing countries, increasing the country's

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typical income in the form of foreign exchange, creating efficiency and specialization of a country's products, expanding consumption of a commodity product that can strengthen the relationship between the countries (Nuri Aslami, 2022; Wang *et al.*, 2022).

Cephalopod is one of the Indonesia's main export commodities in global trade market. Most of the cephalopod products are exported in frozen processed form. In 2021, the import value of cephalopod commodities in China reached USD 1.1 billion, reflecting a 20% annual increase from 2017 to 2021. The largest cephalopod exporter to China in 2021 is Indonesia with a value amounting to USD 265 million. However, India was the largest exporter to China for the period of 2014 to 2019 and 2022 to 2023 (Table 1). Therefore, the main competitor country to Indonesia for cephalopod commodities is India. The types of cephalopod imported by China are frozen processed products, amounting to 90% of the total, and the rest are in other processed forms (Achsa *et al.*, 2021; Mursit, 2022).

Table 1. Trade volume of cephalopod commodities to China

Importing country										
	2014 Tons	2015 Tons	2016 Tons	2017 Tons	2018 Tons	2019 Tons	2020 Tons	2021 Tons	2022 Tons	2023 Tons
China	344,031	362,246	398,654	326,091	145,186	290,161	237,840	405,133	319,225	494,110
Exporting country										
Exporters	2014 Tons	2015 Tons	2016 Tons	2017 Tons	2018 Tons	2019 Tons	2020 Tons	2021 Tons	2022 Tons	2023 Tons
India	2,272	6,221	1,281	922	10,301	29,894	22,256	21,210	18,486	29,595
Indonesia	27,752	41,099	52,879	53,493	82,829	82,700	76,982	102,324	80,275	90,765
Malaysia	2,948	4,067	2,501	848	9,464	20,811	22,864	20,576	20,597	27,906
Thailand	2,327	1,702	864	500	675	4,233	11,062	3,699	4,708	7,012
Pakistan	13	-	-	-	502	461	9,086	19,034	12,207	21,492
Vietnam	4,189	3,422	2,284	5,945	7,016	4,686	7,769	7,036	9,593	No Qty

Trade Map, 2024

The data in Table (1) show that there is a significant increase in the number of cephalopod import activities to China during the observed period (2014-2023). This indicates that there is an increasing demand for imports of cephalopod commodities to China. There were fluctuations in the number of cephalopod imports to China from 2014 to 2016, experiencing a fairly drastic decline from 2017 to 2020, which was possible due to the global coronavirus outbreak. From 2021 to 2023, the number of imports of cephalopod commodities to China increased again. The cephalopod market in China has enormous potential, especially with economic growth continuing to increase. Competition among cephalopod-exporting countries to China is becoming increasingly intense, highlighting the need for strong competitiveness in Indonesian cephalopod commodities to succeed in this market. For exporting countries, especially Indonesia, there are great business opportunities to increase cephalopod exports to China. However, efforts are needed to increase competitiveness by improving product quality that meets food safety standards set by China (Handoyo *et al.*, 2023; Yusufu *et al.*, 2023).

Indonesia is the main supplier country that consistently conducts the largest cephalopod export trade to China; this shows Indonesia's superiority in the production and supply of cephalopods marketed to China. Export growth of cephalopod commodities from competitor countries such as India, Malaysia, Thailand, Pakistan, and Vietnam also shows an increase in exports to China, although not as large as Indonesia. The annual fluctuations in the amount of exports of cephalopod commodities to China may be due to various factors such as price conditions of cephalopod commodities, changes in consumer demand, and trade policies. There has been a rapid increase in cephalopod exports in recent years, especially in 2023. This indicates a rapid growth in the consumption and trade patterns of cephalopods in China (**Khiem *et al.*, 2022; Prashnani *et al.*, 2024**). Southeast Asian countries such as Malaysia, Thailand, Vietnam, and Indonesia have great potential in the production of cephalopods which are marketed to China. Fluctuations in their exports may be influenced by factors such as climate change, competition with other countries, and market demand. Pakistan, a South Asian country, has also shown a significant increase in its cephalopods export in recent years, indicating a large potential for growth in this country (**Ajija *et al.*, 2021; Zeraibi *et al.*, 2021; Trade Map, 2024**).

The largest exporting countries of cephalopod commodities to China are India, Indonesia, Malaysia, Thailand, Vietnam, and Pakistan, which are new competitors in exporting these commodities to the Chinese market. Indonesia is the largest exporter in the number of cephalopod commodities from 2014 to 2023 followed by India and Malaysia, while Thailand, Vietnam, and Pakistan also export to the same destination country. However, when viewed from the number of currency values, Indonesian cephalopod commodities have a low-price value compared to its competitor countries; this has implications for the Indonesian cephalopod commodity (**Li *et al.*, 2022; Wang *et al.*, 2022**).

To improve the competitiveness of frozen cephalopod commodities, Indonesia needs to evaluate factors supporting the competitiveness of these commodities. The supporting factors according to **Porters (1990)** include basic conditions of natural resources, demand conditions, industrialization, product strategy, market opportunities and the role of government. By analyzing the conformity using GAP method, it is expected to answer the problem statement in this study.

- What factors need to be improved and need to be maintained in improving the competitiveness of Indonesian frozen cephalopod commodities in the Chinese market?
- How can Indonesia develop its potential to become the largest sustainable cephalopod exporter in the future?
- What government policies can support the improvement of the competitiveness of Indonesia's frozen cephalopods to become a superior and sustainable commodity in the Chinese market?

MATERIALS AND METHODS

1. Time and place

The research was conducted for 5 months from March to July 2023 in Makassar, Jakarta, Surabaya, and Bali.

2. Sampling data collection method

The research instrument was in the form of a questionnaire given to 38 respondents and a key person in the core issue of the competitiveness factor of frozen cephalopod export to China. The 38 respondents consisted of 18 business actors or cephalopod exporters, 18 government actors, and 2 people who were third parties to the frozen cephalopod export trade activities. The questionnaire contained primary data in a Likert scale on each item of factors supporting the competitiveness of frozen cephalopod commodity exports to China.

3. Data analysis method

The analysis used was GAP analysis which aimed to evaluate the conformity between expectation and realization in the cephalopod product competitiveness factors.

The GAP was calculated based on the method of formula (1) and formula (2):

$$\text{GAP} = \text{Requirements (Y)} - \text{Current implementation (X)} \dots\dots\dots (1)$$

$$\text{Degree of conformity} = (\text{xX})/(\text{xY}) \times 100\% \dots\dots\dots (2)$$

The grading scale used was 0 (not conforming) and 100 (conforming). The maximum value of the strength of cephalopod competitiveness is 100. Furthermore, the level of export competitiveness of cephalopod commodities was determined based on criteria outlined by **Ilmiawan *et al.* (2018)** and **Kristikareni *et al.* (2020a, 2020b)**, as presented in Table (2).

Table 2. Assessment of the level of conformity of the application of the factors of competitiveness of cephalopod products in the Chinese market

Conformity level (%)	Gap from conformity
0 - ≤ 25	Very unsuitable
26 - ≤ 50	Not suitable
51 - ≤ 75	Suitable
76 - ≤ 100	Very suitable

The null hypothesis (H_0) posits that there is no significant gap between expectations and actual outcomes regarding the factors supporting the competitiveness of Indonesian frozen cephalopod commodities. Conversely, the alternative hypothesis (H_1) suggests that there is a significant gap between expectations and actual outcomes related to these supporting factors.

The assessment instrument used is shown in Table (3) below:

Table 3. Reference to the assessment of the conformity of the application of competitiveness factors in cephalopod products

Cephalopod competitiveness factors	Reference
Porter's Diamond Theory 1990	
Basic Factor Conditions; (natural resources, human resources, demographics/distance, <i>sustainability</i> , knowledge, capital, infrastructure)	<ul style="list-style-type: none"> • Ministerial Regulation of Marine and Fisheries Affair No. 10 of 2021; business activity and product standards in the implementation of risk-based business licensing in the marine and fisheries sector • Ministerial decree Marine and Fisheries Affair No. 19 of 2022 concerning Estimation of Fish Resources Potential, Allowable Catch, and Utilization Rate of Fish Resources in WPPNRI.
Demand condition; (Price competition)	<ul style="list-style-type: none"> • Ministerial decree of Marine and Fisheries Affair No. 97 of 2021 concerning Fish Benchmark Price for Calculation of Fisheries Product Levy • Ministerial Regulation of Marine and Fisheries Affair no. 2 of 2023 Requirements and Procedures for Imposing Tariffs on Types of Non-Tax State Revenue Applicable to the Ministry of Maritime Affairs and Fisheries Derived from the Utilization of Fisheries Natural Resources
Product industrialization; related and supporting products	<ul style="list-style-type: none"> • Ministerial Regulation of Marine and Fisheries Affair No. per.27/men/2012 on General Guidelines for Marine and Fisheries Industrialization
Product strategy; product quality, food safety, traceability and product innovation (GHP, GMP-SSOP, HC, HACCP)	<ul style="list-style-type: none"> • Government regulation no. 86 of 2019, Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number PER.13/MEN/2012, • Ministerial Regulation of Marine and Fisheries Affair no. 59 of 2021 concerning increasing the added value of fishery products • Ministerial Regulation of Marine and Fisheries Affair No. 17/Permen-Kp/2019 concerning Requirements and Procedures for Issuing Certificates of Processing Feasibility
Opportunities; changes/shifts beyond the control of exporters, buyers and government, (Covid - 19)	<ul style="list-style-type: none"> • Ministerial regulation Trade of the Republic of Indonesia Number 19 of 2021 concerning Export Policy and Regulation
Government; trade policy (export tax, moratorium on new approval number, logistics system)	<ul style="list-style-type: none"> • Ministerial regulation Trade of the Republic of Indonesia Number 19 of 2021 on Export Policy and Regulation • Ministerial Regulation of Marine and Fisheries Affair No. 58 of 2021 concerning the national fish logistics system

RESULTS

Determination of steps to improve the competitiveness of Indonesia's frozen cephalopod commodities is done by analyzing the conformity on each factor supporting competitiveness based on 6 factors of the Potters diagram. The level of conformity of the factors supporting the competitiveness of Indonesian frozen cephalopod commodities (Table 4) is calculated by dividing the realized value by the expected value.

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Table 4. Conformity level of competitiveness factors

CONFORMITY LEVEL	
Level of conformity = (X/Y) x 100%	
Level of conformity	0.952979
∑ Expectation (Y)	18.03
∑ Realization (X)	17.18

Data in Table (4) indicate that the analysis of conformity between expectations and the implementation of supporting factors for enhancing the competitiveness of Indonesian frozen cephalopod commodities yielded an average value of 0.95%. This indicates a 5% gap between expectations and actual performance. Several supporting factors require prioritization for improvement. According to the Potters diagram, all factors supporting the competitiveness of Indonesia's frozen cephalopod commodities exhibit a gap value (Table 5).

Table 5. GAP factors supporting the competitiveness of Indonesia's frozen cephalopods

Indicator	Realization	Hope	GAP
Natural resource base factors	2.98	3.02	-0.05
Product demand	2.98	2.81	0.17
Product industrialization	2.66	3.02	-0.36
Product strategy	2.90	3.16	-0.26
Market opportunities	2.82	2.96	-0.13
The role of government	2.84	3.06	-0.22

In Table (5), there is a negative value difference, which means that the implementation has a smaller value than expected. These factors are basic natural resource factors, product industrialization factors, market opportunity factors and government role factors in commodity trade. The value of GAP conformity that has a positive value or greater than expectations is the product demand factor and the product strategy factor. The results of the paired sample t-test show a significance value of 0.123, which is greater than 0.05. This indicates that there is no significant difference between expectations and actual outcomes in the application of factors supporting competitiveness.

Furthermore, these data are made in a Cartesian diagram that illustrates each factor supporting competitiveness, as shown in Fig. (1).

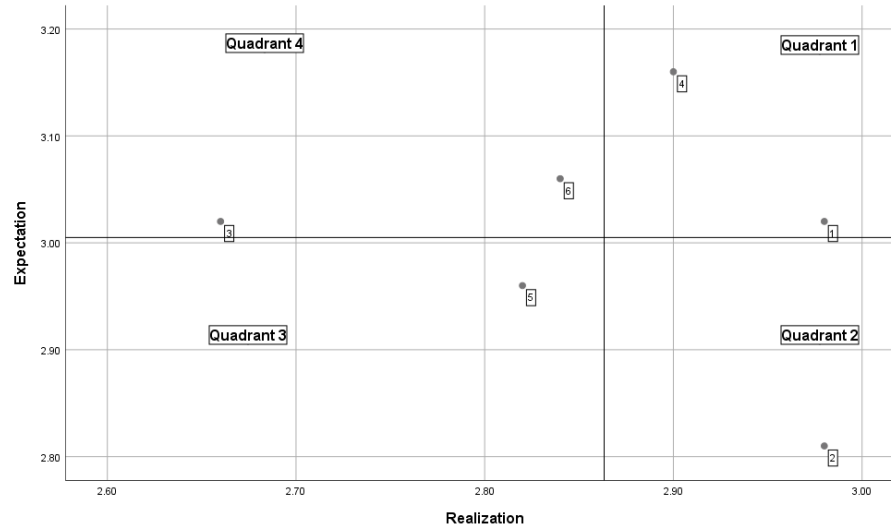


Fig. 1. Cartesian diagram of competitiveness supporting factors

Quadrant 1 represents factors that need to be maintained, characterized by high expectations and high levels of satisfaction. This includes Factor 1 (basic natural resource factors), which should continue to sustain its achievements.

Quadrant 2 is considered an excessive quadrant, where expectations are low but satisfaction is high. This includes Factor 4 (product strategy for Indonesian frozen cephalopod commodities) and Factor 2 (product demand). In this quadrant, it is recommended to raise expectations since the actual performance is sufficiently high.

Quadrant 3 is a low-priority quadrant, marked by low satisfaction and low expectations, specifically Factor 5 (market opportunities for frozen cephalopod commodities). This factor is deemed less important due to both low expectations and low realization.

Quadrant 4 is a top-priority quadrant with high expectations but low satisfaction levels. Factors in this quadrant include Factor 3 (industrialization of frozen cephalopod commodity products) and Factor 6 (government role in frozen cephalopod commodity trade activities). The factors occupying Quadrant 4 are recommended for immediate attention to enhance the competitiveness of these commodities.

1. Resource factor of frozen Cephalopods (cuttlefish-octopus-squid)

Based on the respondents' calculations, the GAP analysis was then carried out by calculating the expectations and realization, as shown in Table (3).

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Table 6. Fish (Cephalopod) resource factors

	Fish (Cephalopod) resource factors	Realization	Hope	GAP
1	Indonesia's fish (Cephalopod) resources are quite high	2.86	2.64	0.22
2	Human resources are sufficient to support the management of frozen cephalopods.	2.94	2.89	0.06
3	Indonesia's demographic distance to China is competitive with India, Thailand and Vietnam.	2.89	3.11	-0.22
4	Knowledge of Indonesia's frozen Cephalopod handling and production is sufficient	3.08	2.97	0.11
5	Indonesian entrepreneurs have sufficient capital and are able to compete	2.97	3.31	-0.33
6	The facilities and infrastructure available are sufficient and adequate in the production of frozen cephalopods.	3.11	3.22	-0.11

Table (6) indicates that in the fish resource factor, there is a gap where the realization exceeds expectations, suggesting a favorable condition that should be maintained. Specifically, Item 1 reflects that the condition of Indonesia's cuttlefish, octopus, and squid resources remains relatively high. Item 2 indicates that human resources are adequate to support cephalopod management. Additionally, Item 4 shows that knowledge regarding the handling and production of frozen cephalopods is considered sufficient. These items are in a desirable condition because their realization surpasses expectations, so they should be sustained to ensure the competitiveness of these commodities.

Conversely, conditions where expectations exceed realization are evident in Item 3, which pertains to Indonesia's demographic distance to China compared to competing countries like Vietnam and Thailand. Item 5 highlights the need for greater capital among Indonesian entrepreneurs, and Item 6 points out that the existing facilities and infrastructure for producing frozen cephalopod commodities are still inadequate. This suggests that, demographically, Indonesia's distance to the target market is less advantageous compared to Vietnam and Thailand due to varying travel distances.

Furthermore, the capital situation for Indonesian entrepreneurs in the commodity processing business is not sufficiently supportive, indicating a need for additional investment. Lastly, the facilities and infrastructure supporting commodity processing activities are minimal, necessitating collaboration among various stakeholders to improve these aspects.

The level of conformity between expectations and realizations for the resource factor was calculated by dividing the realization values by the expected values, as presented in Table (7).

Tabel 7. Conformity level of fish (Cephalopod) resource factors

CONFORMITY LEVEL	
Level of Conformity = (X/Y) x 100%	
∑ Expectation (Y) =	3.022619
∑ Realization (X) =	2.976852
TKI =	0.984858

From this analysis, it can be seen that in the fish resource condition factor, there are greater expectations than realization with a suitability level value of 0.98, which means that there are several factors that need to be improved.

The results of the paired samples t-test statistical difference test show a significant value ($0.620 > 0.05$) or there is a significant difference between expectations and realization in the resource condition factor. Furthermore, these data are made in a Cartesian diagram that illustrates each item of the resource factor, as shown in Fig. (2).

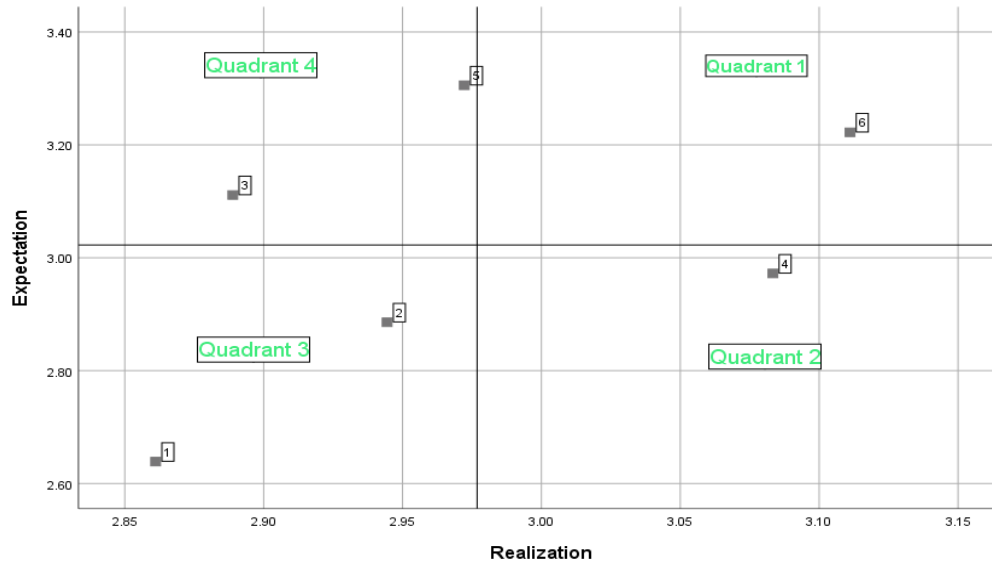


Fig. 2. Cartesian diagram of resource factor on frozen cephalopods (cuttlefish-octopus-squid)

Quadrant 1 is a quadrant that needs to be maintained because it has been fulfilled between expectations and realization. In this quadrant there are points, namely the condition of facilities and infrastructure supporting the process. Quadrant 2 is an excessive quadrant where the level of expectation is low and the level of satisfaction is high, namely item 4 (knowledge of handling and production), so in this quadrant it is recommended that there is a need to increase expectations because the application in the field is quite high. Quadrant 3 is a low-priority quadrant, namely with a low level of satisfaction and low expectations, namely in items 1 (condition of fish resources) and 2 (human resources), so this quadrant is considered less important because of low expectations and low realization. Quadrant 4 is a top priority quadrant with high expectations and a low level of satisfaction, namely in items 3 (demographic distance conditions between Indonesia and China) and 5 (capital of Indonesian entrepreneurs). Therefore, in this quadrant, it is recommended to get top priority to be addressed immediately because implementation in the field is still not in line with expectations.

2. Cephalopod commodity demand condition factor

The results of the GAP analysis on the export demand condition of Cephalopod commodities are presented in Table (8).

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Table 8. Cephalopod commodity demand condition factors

	Factor Cephalopod commodity demand conditions	Realization	Hope	GAP
1	Indonesia's frozen cephalopod product prices are competitive compared to competitor countries	2.89	2.97	-0.08
2	Indonesia's demand/supply of frozen cephalopods to the Chinese market is high	3.17	2.94	0.22
3	The number of Indonesia's frozen cephalopod exports increases every year	2.97	2.75	0.22
4	Indonesia's frozen cephalopod products have met the standards of consumer desires in the Chinese market	3.17	2.97	0.19
5	Indonesia's frozen cephalopod exports have yet to meet demand in the Chinese market	2.97	2.83	0.14
6	Prices of Indonesian frozen cephalopod products are competitive with other substitutes (other substitute food products)	2.72	2.39	0.33

The price condition of cephalopod commodity products is competitive compared to countries like Vietnam and Thailand, with a GAP value of -0.08. This indicates a gap where realization is lower than expected. In contrast, the demand and supply factors for Indonesian frozen cephalopods in the Chinese market are strong, evidenced by a GAP value of 0.22, meaning realization exceeds expectations.

Item 3, which tracks the increasing number of Indonesian frozen cephalopod exports each year, also has a GAP value of 0.22, indicating that realization is higher than expected. Item 4 reveals that Indonesian frozen cephalopod products meet consumer standards in the Chinese market, reflected in a GAP value of 0.19, showing that actual performance surpasses expectations.

However, Item 5 indicates that the number of Indonesian frozen cephalopod exports has not fully met demand in the Chinese market, with a GAP value of 0.14, indicating a discrepancy where realization exceeds expectations. Finally, Item 6 shows that the price of Indonesian frozen cephalopod products is competitive with other substitute food products, with a GAP value of 0.33, again indicating that realization is higher than expectations.

The overall conformity value for the demand condition of cephalopod commodities is presented in Table (9).

Table 9. Level of conformity of demand conditions for Cephalopod commodities

CONFORMITY LEVEL	
Level of Conformity = (X/Y) x 100%	
Level of Conformity	1.060956
∑ Expectation (Y)	2.810185
∑ Realization (X)	2.981481

Furthermore, the result of paired samples t-test analysis is 0.030 which is smaller than 0.05. The conclusion is that there is no significant difference between expectations and realizations on the factor of export demand conditions for these commodities.

Furthermore, the data are made in a Cartesian diagram that illustrates each item of the factor as follows.

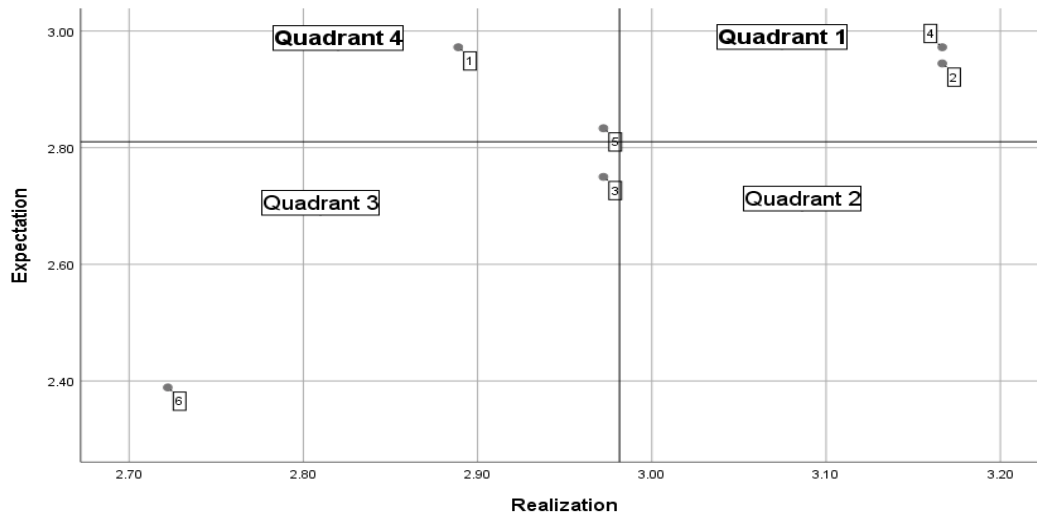


Fig. 3. Cartesian diagram of cephalopod commodity demand condition factor

Quadrant 1 is a quadrant that needs to maintain its achievements, namely with high expectations and high levels of satisfaction, namely items 4 (Indonesian frozen cephalopod products have met the standards of consumer desires in the Chinese market) and 2 (Demand/supply of Indonesian frozen cephalopods to the Chinese market is high), then in this quadrant the items of competitiveness support factors must be able to maintain achievement because they are considered to be in accordance between expectations and realization in the field. Quadrant 2 is an excessive quadrant where the level of expectation is low and the level of satisfaction is high but there are no demand factor items in this area. Quadrant 3 is a low-priority quadrant, namely with a low level of satisfaction and also low expectations, namely item 6 (The price of Indonesian frozen cephalopod products is competitive with other substitute products (other substitute food products)) and 3 (The number of Indonesian frozen cephalopod exports increases every year), so this quadrant is considered less important because of low expectations and also low realization. Quadrant 4 is a top priority quadrant with high expectations and a low level of satisfaction, namely items 1 (the price of Indonesian frozen cephalopod products is competitive when compared to competing countries Vietnam and Thailand) and 5 (the number of Indonesian frozen cephalopod exports has not met the demand in the china market, so in this quadrant it is recommended to get top priority to be addressed immediately because the implementation in the field is still not in line with expectations).

3. Industrialization factor of Indonesian frozen cephalopod commodities

The GAP value on the industrialization factor of Indonesia's frozen cephalopods commodity is shown in Table (10).

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Table 10. Industrialization factors of Indonesian frozen cephalopod commodities

	Industrialization factors	Realization	Hope	GAP
1	Availability of cephalopod raw materials is sufficient for the domestic industry	3.03	2.64	0.39
2	Supporting facilities and infrastructure are sufficient in the fishing ground area.	2.78	3.17	-0.39
3	Sufficient capital for cephalopod fishermen	2.39	3.08	-0.69
4	The distribution system between fishing ground landing areas has been effective	2.58	3.06	-0.47
5	Transportation cost from raw material source to industry is adequate	2.64	3.08	-0.44
6	Management of logistics systems and information networks in the preparation of cephalopod raw materials is adequate	2.53	3.08	-0.56

In the analysis:

- **Item 1:** The availability of sufficient cephalopod raw materials for the domestic industry has a GAP value of 0.39, indicating that realization exceeds expectations. This aspect should be maintained to support the competitiveness of these commodities.
- **Item 2:** The availability of supporting facilities and infrastructure in fishing areas has a GAP value of -0.39, suggesting that realization is still lower than expected, which hinders competitiveness.
- **Item 3:** Sufficient capital for cephalopod fishermen shows a GAP value of -0.96, indicating that actual conditions in the field fall significantly short of expectations.
- **Item 4:** The effectiveness of the distribution system between fishing landing areas has a GAP value of -0.47, meaning realization is still below expectations, negatively impacting competitiveness.
- **Item 5:** Transport costs from raw material sources to the industry are deemed adequate, with a GAP value of -0.44, indicating that realization remains less than expected.
- **Item 6:** The management of logistics systems and information networks for preparing adequate cephalopod raw materials has a GAP value of -0.56, highlighting that actual implementation is still below expectations and does not support competitiveness effectively.

The overall conformity value of the industrialization factor of Indonesia's frozen cephalopod is shown in Table (11).

Table 11. The level of conformity of industrialization factors of frozen cephalopod

CONFORMITY LEVEL	
Conformity level = (x/y) x 100%	
Conformity level	0.88
∑ Expectation (y)	3.02
∑ Realization (x)	2,66

Furthermore, a statistical difference test was conducted by comparing the mean paired-sample t-test. The result indicated a significant value of 0.069 which is greater than 0.05. Thus, there is a difference between expectation and realization on the industrialization factor of the Indonesian frozen cephalopod commodity. Furthermore, the Cartesian diagram depicts each item of the factor as follows:

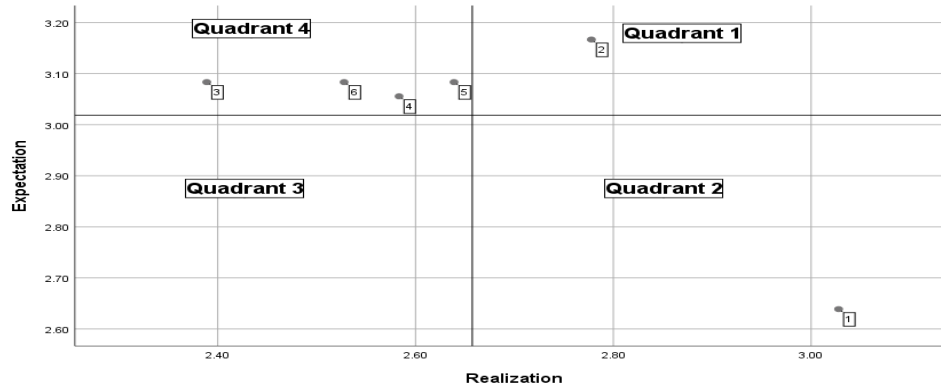


Fig. 4. Cartesian diagram of industrialization factor of Indonesian frozen cephalopod commodities

Quadrant analysis:

- **Quadrant 1:** This quadrant requires maintenance, characterized by high expectations and high satisfaction levels. Notably, **Item 2** (Sufficient supporting facilities and infrastructure in the fishing ground area) falls here. The focus should be on maintaining the achievements in this area.
- **Quadrant 2:** This quadrant indicates an excessive scenario, where expectations are low but satisfaction is high. **Item 1** (Management of logistics systems and information networks in the preparation of adequate cephalopod raw materials) is included here. It is recommended to raise expectations, as the application in the field is performing well.
- **Quadrant 3:** This is a low-priority quadrant with both low satisfaction and low expectations. Notably, there are currently no items in this supporting factor.
- **Quadrant 4:** This is the top priority quadrant, featuring high expectations but low satisfaction levels. The items in this quadrant include:
 - **Item 3:** Sufficient capital for cephalopod fishermen
 - **Item 4:** Effective distribution system between fishing ground landing areas
 - **Item 5:** Adequate transportation costs from raw material sources to the industry
 - **Item 6:** Management of logistics systems and information networks in preparing cephalopod raw materials.

These items require immediate attention to enhance the competitiveness of these commodities.

4. Cephalopod commodity product strategy factors

The GAP value on the frozen cephalopods commodity strategy factor is presented in Table (12).

Table 12. Cephalopod commodity product strategy factors

	Cephalopod commodity product strategy factors	Realization	Hope	GAP
1	Fishermen have implemented GHP/handling of frozen cephalopod products	3.17	2.58	0.58
2	Business actors have implemented GMP-SSOP on frozen cephalopod products	2.94	3.42	-0.47
3	Business actors have implemented HACCP and HC on frozen cephalopod products	2.97	3.56	-0.58
4	Businesses have implemented cold chain in cephalopod products	2.97	3.58	-0.61
5	Business actors have implemented traceability in cephalopods	2.83	3.03	-0.19
6	Businesses have implemented cephalopod product innovation or development	2.50	2.78	-0.28

Analysis of handling practices for frozen cephalopod products

1. **Item 1:** Fishermen's application of Good Handling Practices (GHP) for frozen cephalopod products shows a GAP value of **-0.58**. This indicates that the realization is lower than expected, highlighting the need for improvements in GHP application at the fishermen level.
2. **Item 2:** The implementation of Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP) by business actors has a GAP value of **0.47**. This suggests that the actual application exceeds expectations, supporting competitiveness effectively.
3. **Item 3:** The application of Hazard Analysis Critical Control Points (HACCP) and Hygiene Control (HC) in frozen cephalopod products has a GAP value of **0.58**. This indicates that the level of implementation in the field is higher than what was anticipated.
4. **Item 4:** Business actors have also successfully implemented a cold chain for cephalopod products, with a GAP value of **0.61**. This reflects a realization that surpasses expectations.
5. **Item 5:** The implementation of traceability systems for cephalopods shows a GAP value of **0.19**, indicating that the actual realization is greater than expected.
6. **Item 6:** Business actors' efforts in innovating or developing cephalopod products yield a GAP value of **0.28**, meaning that the application in the field exceeds expectations.

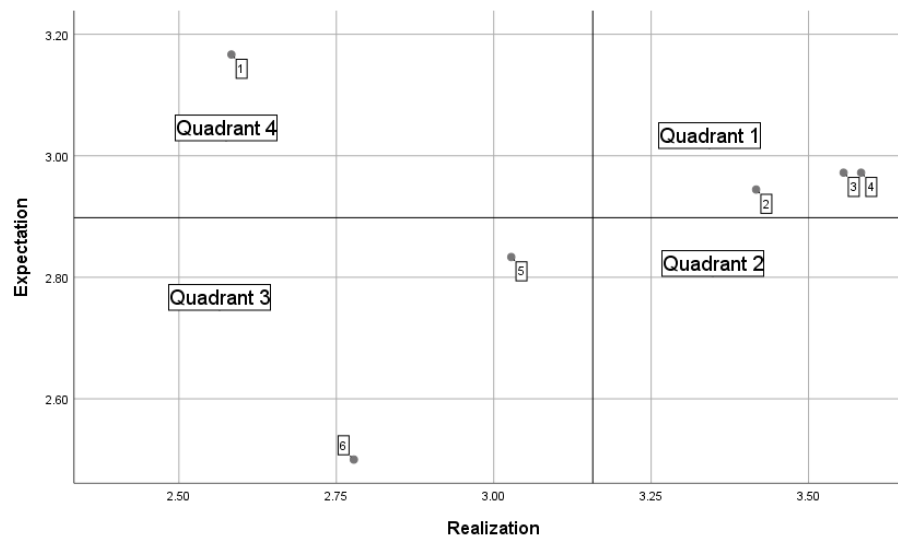
The overall conformity value of the strategy factor for Indonesia's frozen cephalopods is summarized in Table (13).

Table 13. Level of conformity on product strategy factors for frozen Cephalopod

Conformity level	
Conformity Level = (X/Y) x 100%	
Conformity Level	0.918
∑ Expectation (Y)	3.16
∑ Realization (X)	2.90

The results of the paired samples t-test analysis obtained a significance value of 0.212 which is greater than 0.05.

Thus, there are differences between expectations and realizations on the strategic factors of Indonesian frozen cephalopod products. The next stage is that the data are poured into a Cartesian diagram.

**Fig. 5.** Cartesian diagram of cephalopod commodity product strategy factors

Quadrant analysis of product strategy factors for frozen cephalopod products

1. **Quadrant 1:** This quadrant represents areas that need to maintain achievements, characterized by high expectations and high levels of satisfaction. However, there are currently no points within this quadrant for the cephalopod product strategy.
2. **Quadrant 2:** In this excessive quadrant, expectations are low, but satisfaction is high. Here, we find **Item 1:** "Fishermen have implemented Good Handling Practices (GHP) for frozen cephalopod products." This indicates that while the realization is satisfactory, there is room to raise expectations further.
3. **Quadrant 3:** This low-priority quadrant contains items with both low satisfaction and low expectations. Specifically, **Item 5:** "Business actors have implemented traceability for cephalopods," and **Item 6:** "Business actors have implemented innovation or development

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of cephalopod products." Improvements are crucial in this quadrant to elevate expectations and realization.

4. **Quadrant 4:** This top-priority quadrant shows high expectations but low satisfaction. It includes:
 - **Item 2:** "Business actors have implemented GMP-SSOP on frozen cephalopod products."
 - **Item 3:** "Business actors have implemented HACCP and Hygiene Control (HC) on frozen cephalopod products."
 - **Item 4:** "Business actors have implemented a cold chain for cephalopod products."

These items should be prioritized for immediate action to enhance the competitiveness of these commodities.

5. Market opportunity factors for frozen cephalopod commodities in Indonesia

The GAP value of conformity in the market opportunity factor is shown in Table (14).

Table 14. Market opportunity factors for Indonesian frozen cephalopod commodities

	Market opportunity factors	Realization	Hope	GAP
1	Socio-economic and political conditions in China are stable enough for the development of Indonesia's frozen cephalopod market	2.92	2.67	0.25
2	The Chinese market has an appetite for Indonesian frozen cephalopod products	3.19	3.00	0.19
3	China's market conditions are very conducive to Indonesia's frozen cephalopod imports	3.14	3.42	-0.28
4	Covid 19 pandemic conditions increase demand for Indonesia's frozen cephalopod products	2.47	3.00	-0.53
5	Tariff barriers to exports of Indonesian frozen cephalopod products to the Chinese market are low	2.67	2.50	0.17
6	Indonesia's trade transaction system for exporting frozen cephalopod products to China is relatively easy	2.56	3.17	-0.61

Analysis of market opportunity factors for Indonesian frozen Cephalopod products

Item 1: The socio-economic and political conditions in China are quite stable for the development of the Indonesian frozen cephalopod market, with a difference value of **0.25**. This indicates that the realization in the field exceeds expectations.

Item 2: The Chinese market has a suitable demand for Indonesian frozen cephalopod products, reflected by a value of **0.19**, also showing that the realization surpasses expectations.

Item 3: Chinese market conditions are very conducive to imported Indonesian frozen cephalopod products, which has a value of **-0.28**. This suggests that actual conditions are not aligned with expectations.

Item 4: The Covid-19 pandemic conditions have led to an increase in demand for Indonesian frozen cephalopod products, with a value of **-0.53**. This indicates that the realization is significantly lower than expected.

Item 5: Tariff barriers for exports of Indonesian frozen cephalopod products to the Chinese market are low, with a value of **0.17**, meaning the realization is higher than what was expected.

Item 6: The trade transaction system for exporting Indonesian frozen cephalopod products to China is relatively easy, reflected by a value of **-0.61**, indicating that the realization does not meet expectations.

The overall conformity value of the market opportunity factors for Indonesia's frozen cephalopod products is detailed in Table (15).

Table 15. Level of conformity of market opportunity factors for frozen cephalopod products

CONFORMITY LEVEL	
Conformity Level = (X/Y) x 100%	
Conformity Level	0.95
∑ Expectation (Y)	2.96
∑ Realization (X)	2.82

The results of the paired samples t-test obtained a value of 0.434 which is greater than 0.05, so there is a difference between expectations and realization of the market opportunity factor for Indonesian frozen cephalopods commodities.

The next stage involves presenting the data in a Cartesian diagram, which is shown below.

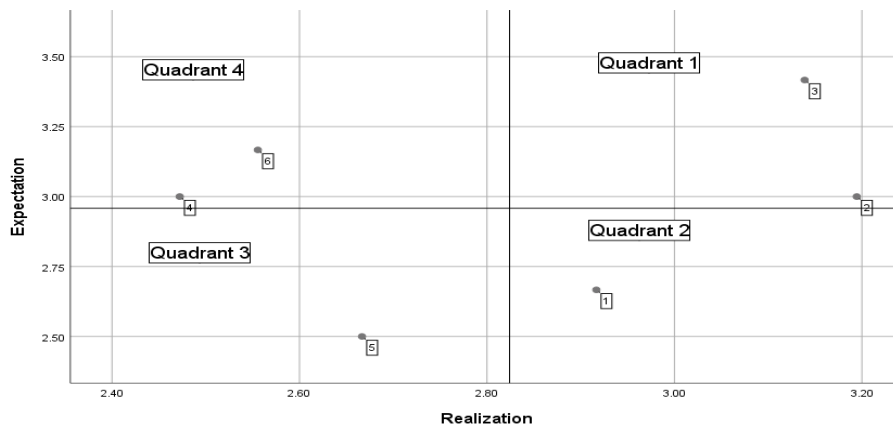


Fig. 6. Cartesian diagram of market opportunity factors for frozen cephalopod commodities in Indonesia

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Quadrant 1 includes items that need to be maintained, characterized by high expectations and high satisfaction levels: item 2 (The Chinese market has appropriate desires for Indonesian frozen cephalopod products) and item 3 (Chinese market conditions are very conducive to imported Indonesian frozen cephalopod products). In this quadrant, these factors must sustain their achievements.

Quadrant 2 represents an excessive quadrant, where expectations are low and satisfaction is high, specifically item 1 (Socioeconomic and political conditions in China are quite stable for the development of the Indonesian frozen cephalopod market). Here, it is recommended to increase expectations since the current performance is already quite high.

Quadrant 3 is a low-priority quadrant, featuring item 5 (Tariff barriers to exports of Indonesian frozen cephalopod products to the Chinese market are low), which has low satisfaction and expectations, making it less critical.

Quadrant 4 is a top-priority quadrant with high expectations and low satisfaction levels, including item 4 (The condition of the Covid-19 pandemic has increased demand for Indonesian frozen cephalopod products) and item 6 (The trade transaction system for exporting Indonesian frozen cephalopod products to China is relatively easy). Factors in this quadrant require immediate attention to improve the competitiveness of these commodities.

6. Government role factor

The GAP value of suitability in the government role factor is shown in the Table (16).

Table 16. Government role factors

	Government role factors	Realization	Hope	GAP
1	Indonesia's export tax rate policy for frozen cephalopod products to China is low	2.72	2.67	0.06
2	Indonesia's export license for frozen cephalopod products to China is quite easy	2.47	3.61	-1.14
3	The government facilitates trade agreements with export destination countries (China)/ such as Issuance and extension of approval numbers	3.34	3.00	0.34
4	Government facilitates activities to improve market access/promotion of frozen cephalopod products	2.92	3.00	-0.08
5	Government facilitates dispute settlement on Indonesia's frozen cephalopod products	3.03	2.94	0.08
6	The government harmonizes the logistics network system for inter-island cephalopod raw materials to reduce domestic product transportation costs.	2.58	3.17	-0.58

Item 1 indicates that the export tax rate policy for Indonesian frozen cephalopod products to China is low, with a difference value of 0.06, meaning that the actual realization is higher than expected. Item 2 notes that the licensing process for exporting these products to China is quite easy, reflected in a value of -1.14, indicating that the realization is lower than anticipated.

Item 3 shows that the government facilitates trade agreements with export destination countries like China, achieving a value of 0.34, which means the actual conditions are better than expected. However, item 4, concerning government support for market access and promotion of frozen cephalopod products, has a value of -0.08, indicating that the realization does not meet expectations.

Item 5 highlights that the government facilitates dispute resolution for Indonesian frozen cephalopod products, with a value of 0.08, meaning the realization exceeds expectations. In contrast, item 6 states that the government harmonizes the logistics network for inter-island cephalopod raw materials to reduce transportation costs, but it has a value of -0.58, indicating the realization is lower than expected.

Overall, the conformity level for the market opportunity factor for Indonesian frozen cephalopod commodities is 0.98.

Table 17. Level of conformity of government role factor for Indonesian frozen cephalopod commodity products

CONFORMITY LEVEL	
Conformity Level = (X/Y) x 100%	
Conformity Level	0.98123
∑ Expectation (Y)	3836
∑ Realization (X)	3764

The next step is to conduct a t-test to evaluate the hypothesis regarding whether there is a significant difference between expectations and realizations of the market opportunity factor for frozen squid commodity products. The results of the paired samples t-test analysis yielded a significance value of 0.366, which is greater than 0.05. This indicates that there is no significant difference between expectations and realizations for the government role factor.

Subsequently, the data will be represented in a Cartesian diagram, illustrating each item of the government role factors across four quadrants, as shown in Fig. (7).

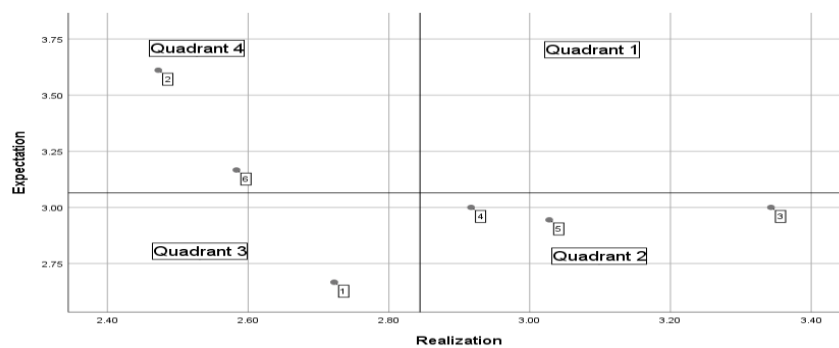


Fig. 7. Cartesian diagram of government role factor

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Quadrant 1 is one that needs to maintain its achievements, characterized by high expectations and high levels of satisfaction; however, this quadrant does not exist in this context.

Quadrant 3 is a low-priority quadrant, marked by low levels of satisfaction and low expectations. This includes item 1 (The export tax rate policy for Indonesia's frozen cephalopod products to China is low), which is considered less important due to both low expectations and low realization.

Quadrant 2 is an excessive quadrant where expectations are low and satisfaction levels are high. This includes items 3 (The government facilitates trade agreements with export destination countries, such as the issuance and extension of approval numbers), 4 (The government facilitates activities to increase market access/promotion of frozen cephalopod products), and 5 (The government facilitates the settlement of disputes over Indonesia's frozen cephalopod products). In this quadrant, it is recommended to increase expectations because the current application in the field is quite high.

Quadrant 4 is a top-priority quadrant, featuring high expectations and low levels of satisfaction. This includes item 2 (The licensing of exports of Indonesian frozen cephalopod products to China is quite easy) and item 6 (The government harmonizes the logistics network system for inter-island cephalopod raw materials to reduce product transportation costs in the country). These factors should be prioritized for immediate attention to enhance the competitiveness of these commodities.

DISCUSSION

From the results of the GAP analysis of the factors supporting the competitiveness of Indonesian frozen cephalopods commodities, the results obtained with a significance value of 0.123, suggesting that there is a difference between realization and expectations in its application. The gaps or differences from largest to smallest are as follows:

- a. Industrialization factors of Indonesia's frozen cephalopod commodities
- b. Product strategy factors of Indonesia's frozen cephalopod commodities
- c. Government role factors in commodity competitiveness improvement activities
- d. Market opportunity factors in Indonesia's frozen cephalopod commodities
- e. Natural resource base factors of Indonesia's frozen cephalopod commodities

The level of conformity of the application of supporting factors of competitiveness that need to be maintained is the high demand for frozen cephalopods commodity products; this factor must be maintained to maintain the consistency of the competitiveness of these commodities.

Based on the GAP analysis data, it can also be seen that the industrialization factor is the factor with the highest gap value. In the industrialization factor, the biggest GAP is on the issue of capital, where Indonesian cephalopod fishermen are still minimal in number or limited. Fishermen's capital constraints will have an impact on the amount and quality of the catch. (**Pranata, 2019**).

The business of small and medium-sized fishermen are self-financing businesses comes from their capital, and if it is insufficient, fishermen will borrow from financial institutions (Banks). The fishermen's capital can also be in the form of equipment or accumulation of goods to operate the

fishing activities, both fishing equipment and equipment for handling the catch, so the lack of capital owned by the fishermen will affect the process of fishing activities and handling catches that are more economical and simple from the fishermen's point of view, without paying attention to the handling and quality of the catch, therefore guidance is needed for fishermen to have effective and efficient management of fishing activities in terms of time costs and increased fishermen's income (**Mostafa *et al.*, 2020; Robert *et al.*, 2020**). The next problem of fishermen in cephalopod commodity fishing activities is the difficulty of obtaining capital loans from formal institutions (banks) due to the lack of trust of investors in providing capital guarantees for the development of the fishing business, this cannot be separated from the high risk in running fishing business activities. The role of government is needed in mediating the capital of fishermen in the fishing business and running the basic insurance guarantee system in these activities (**Christopher *et al.*, 2018**).

The next problem in the industrialization factor is the weak application of logistics systems and information networks in the preparation of goods and adequate cephalopod raw materials. Thus, it is necessary to improve the management system of fish logistics management where there are still many obstacles in its application, including creating harmonization in the field of regulation and management of fish logistics governance in business actors from upstream to downstream commodities, from fishermen, traders, collectors, and distributors, processing industries and logistics service actors. The next logistics system improvement is to create a management of information and communication data systems as a basis for production, distribution, availability of cephalopod raw material supplies, and ease of product traceability. The next step is to increase the strengthening of the connectivity system and logistics services, and the last step is to increase the efficiency of management of the quantity and quality of the supply chain system for cephalopod commodity raw materials (**Bosona & Gebresenbet, 2023**).

The next biggest GAP in the industrialization factor is that the distribution system between fishing ground landings is not yet efficient, and the amount of transportation costs from the source of raw materials between inter-island areas is large; the availability of supporting infrastructure in the fishing ground area is still minimal, which affects the quality and price of raw materials (**Georgianna *et al.*, 2017**).

The second level of GAP is the product strategy factor, where the biggest GAP is the implementation of a cold chain system from the catching stage to the marketing and processing chain. Some fishermen still reject to apply the cold chain to reduce operational costs and some even use other hazardous materials to maintain the quality of the catch. The GAP also occurs at the stage of implementation of HACCP and HC by business actors (fishermen, collectors or processors and distributors). There are several obstacles related to the rejection of Indonesian frozen cephalopod products in export destination countries, primarily due to biological, chemical, and physical hazards. The lack of ships implementing Hazard Analysis Critical Control Points (HACCP) and Hazard Control (HC) protocols is a significant barrier to the competitiveness of these export commodities. Furthermore, the application of Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOP) in fishing, processing, and distribution

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remains minimal, necessitating socialization and guidance to uphold the quality of frozen cephalopod products.

Business actors also show limited implementation of traceability and innovation, which could enhance the value of their commodities, indicating a need for support from authorities. To improve strategic factors and product quality, efforts should focus on establishing a product guarantee system for end consumers through certifications like Good Handling Practices (GHP), HACCP, and Catch Certification. These measures ensure the safety of the products and can positively influence market prices (**Belhabib *et al.*, 2015; Teresa *et al.*, 2018**).

Such initiatives are vital for sustaining international trade and reducing the incidence of product rejections in China due to hazardous materials, particularly heavy metals and microbial contamination. Implementing a quality assurance certification system from capture to consumer is essential for guaranteeing product safety and enhancing the competitiveness of these commodities (**Kroetz *et al.*, 2015**).

The third GAP conformity is the role of the government in activities to increase the competitiveness of frozen cephalopods. The factor of the government's role in terms of granting export permits is still not by the realization of implementation in the field. This is due to the large number of domestic levies that will increase the cost of goods sold considering the vast territory of Indonesia with a large number of inter-island landings. The next mismatch is the government's role in providing an integrated logistics system between islands and regions. The logistics system is used as a cephalopod raw material warehouse to reduce quality degradation, reduce costs, and facilitate fishermen in managing the cephalopod trade. The next obstacle is the lack of promotional facilitation and wider market access for small and medium fishermen to make it easier to trade cephalopods. The government needs to increase the number of trade export access points directly to destination countries to be more efficient in reducing transportation costs between regions between islands (**Costello *et al.*, 2016**).

The market opportunity factor for Indonesia's frozen cephalopod commodities in detail has the GAP conformity, namely the trade transaction system for exporting frozen cephalopod products to the Chinese market, which still has obstacles considering that the trade system to China is Business to Business which conducts trade activities directly between companies, but if there is obstacle such as rejection or suspension of fishery products in the country, the role of the government in mediating is needed to provide solutions to these obstacles. The next GAP in the market opportunity factor is the condition of the last COVID-19 pandemic which still leaves the implementation of new rules that are much stricter by conducting or attaching a large number of COVID-19 SWAB test results, thus increasing the time and cost of carrying out these export activities (**Bhowmik *et al.*, 2022; Liu & Qiu, 2024**). The next obstacle to GAP conformity is the condition of the Chinese market which is not conducive to imported frozen cephalopod products from Indonesia, this cannot be separated from the uncertainty of global economic policy which also has an impact on economic stability in countries that are integrated into frozen cephalopod commodity trading activities between China and Indonesia. The uncertainty of China's economic policy will have an impact on inflation, investment and especially on the price of frozen

cephalopod commodities in Indonesia. This condition is rather difficult to control given the magnitude of global macroeconomic influences that affect the price of these commodities but these conditions can be anticipated by preparing for the impact caused early (Su *et al.*, 2022; Lou *et al.*, 2024).

Factors supporting the competitiveness of Indonesian frozen cephalopod commodities in the Cephalopod fish resource factor is a GAP of conformity between expectations and realization in the field. The condition of cephalopod fishermen's capital is still an obstacle in creating sustainable management of cephalopod resources both from economic, social and environmental aspects so that fishermen prioritize the number of catches. The lack of capital owned by small-scale fishers will cause an imbalance in carrying out sustainable fishing activities, most of them override sustainability factors by catching all sizes of cephalopod species and harvesting squid eggs, with the lack of capital fishers also make various savings to reduce production costs. Fishing activities are free and there is no ownership or common property, hence management by the government is needed to prevent capitalism by fishing businesses to create sustainability and justice for all fishermen, who catch this biota and maintain sustainability both economically, ecologically, and socially for all Indonesian people (Huang *et al.*, 2014; Grainger *et al.*, 2016; Pfeiffer *et al.*, 2016). One of the efforts that can be made to create measurable and sustainable fishing is by conducting certified fishing activities; the certification can serve as a guarantee of the quality of the catch and can facilitate the ability to trace the catch of the biota species. Some cephalopod species that are considered to be of high economic value need to be monitored relatively well by conditionally labeling them as environmentally friendly by Marine Stewardship Council (MSC) certification, which will certainly increase the selling value of the catch. In cephalopod fishing activities, the application of Good Handling Practice GHP, GMP-SSSOP, and the application of HACCP on board will affect the attractiveness of consumers to demand products and provide higher selling value (Brewer, 2011; Christie *et al.*, 2016; Gill *et al.*, 2017). Another effort that needs to be made by the government is to conduct counseling through policy implementers through relevant agencies and ministries, namely by conducting socialization and guidance regarding the importance of implementing a certification system on board of the ship from fishing activities to the hands of end consumers. These efforts must be carried out in a harmonious and integrated manner by fisheries actors (distributors and fish processors) policy implementors (government) and buyers who are the final destination of frozen cephalopod commodities (Da Rocha *et al.*, 2012; Kuriyama *et al.*, 2016). The implementation of a certification system on board for catch commodities will facilitate the anticipation of product rejections due to quality issues and fraud in global trade. This approach is expected to enhance consumer trust and increase the selling value of these products (Brinson *et al.*, 2016; Gelcich *et al.*, 2017).

The demographic conditions of the distance between Indonesia and China's market destination countries which are quite far and require sea or air transportation are one of the constraining factors in competing competitiveness with India, Thailand, and Vietnam. This is supported by the territory of Indonesia which consists of many islands, making the distribution

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costs between inter-island areas greater and the distance to export destination countries which are also further away compared to competing countries (Andriyono, 2018; Oktavilia *et al.*, 2019). Efforts need to be made to increase the direct export gates of these commodities from the location to the export destination to break the long local distribution chain, then it is also necessary to increase the number of logistics systems by creating fish barn areas to anticipate the lean season and also to maintain the quality of raw materials, and assist fishermen in selling and storing the catch to get the fish warehouse receipt (Reeves, 2018; Suyanta *et al.*, 2023).

The availability of facilities and infrastructure to support the production of frozen cephalopod commodities is inadequate, presenting a significant gap in the field. This lack of resources hinders the maintenance of quality and quantity in frozen cephalopod products, particularly in remote island areas that serve as major sources of raw material (Teniwut *et al.*, 2020). Indonesia's archipelagic geography complicates access to essential auxiliary materials, such as ice and electricity, leading to a shortage of ice factories and fish processing units. Key infrastructure, including reliable electricity supply and freezing warehouses, is crucial for fishermen. These facilities help accommodate catches and provide storage, allowing fishermen to secure warehouse receipts and better manage lean seasons (Asogwa *et al.*, 2019; Mardia *et al.*, 2021). Enhancing these infrastructures is essential for facilitating distribution and transportation activities, ultimately maintaining the quality of raw materials and improving processing and transportation efficiency.

CONCLUSION

The GAP analysis of Indonesian frozen cephalopod export commodities, based on the Diamond Potter's framework, yielded an average value of 0.98. This indicates a gap where expectations exceed realizations across several factors, including industrialization, product strategy, government roles, market opportunities, natural resource factors, and product demand.

The t-test analysis reveals a significance value of 0.123, which is greater than 0.05, indicating a notable difference between expectations and realizations regarding the factors supporting competitiveness.

The Cartesian diagram highlights key priorities for improvement to enhance competitiveness: the industrialization of products, product strategy, and government role factors. The natural resource base factor is identified as a priority that should be maintained, while market opportunity factors are classified as low priority. The product demand factor has been over-prioritized.

To achieve greater conformity between expectations and realizations, the following improvement efforts are recommended:

1. **Enhance Investor Trust:** Mediation is necessary to build investor confidence in business capital. This can be facilitated through formal financial institutions (banks) offering financial support, capital facilities, business capital stimulants, and operational insurance guarantees. Increased capital is expected to improve the quality and quantity of frozen

cephalopod raw materials, thereby enhancing income and welfare for business actors and boosting competitiveness in the global market.

2. **Develop an Integrated Logistics System:** Establishing a cohesive logistics system for managing cephalopod raw materials will streamline the warehouse receipt system for fishery products and improve governance within the fish logistics framework.
3. **Create Information and Communication Systems:** Implement a robust management system for information and communication data to enhance production, distribution, availability of cephalopod raw material supplies, and facilitate product traceability.
4. **Strengthen Connectivity and Logistics Services:** Improving connectivity systems and logistics services is essential for enhancing the efficiency of raw material supply chains for cephalopod commodities.
5. **Implement Quality Certifications:** Strengthen the strategic factors and quality of cephalopod products by adopting a catch certification system and quality certifications such as Good Handling Practices (GHP), Hazard Analysis and Critical Control Points (HACCP), and eco-labeling, including Marine Stewardship Council certification.
6. **Improve Distribution Connectivity:** Enhance the connectivity in the distribution of cephalopod commodities to reduce inter-island distribution costs and minimize retribution, thereby lowering production costs.
7. **Government Support:** The government should intensify efforts to mediate issues faced by commodities and provide guidance and assistance to businesses involved in exporting these products.

ACKNOWLEDGEMENTS

The authors would like to thank the Center for Marine and Fisheries Education, Marine and Fisheries Human Resources Research and Development Agency, Ministry of Marine Affairs and Fisheries, Jakarta, Indonesia for providing funding assistance so that this research can be carried out properly.

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