

The determinants of export performance and the perspective to improve international competitiveness for Thai fisheries sector.



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ปัจจัยกำหนดประสิทธิภาพการส่งออกและมุมมองในการปรับปรุงความสามารถในการแข่งขัน
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ประเทศไทยเป็นผู้ส่งออกรายใหญ่รายหนึ่งในตลาดปลาโลก ในขณะที่โลกาภิวัตน์และการบูรณาการทางเศรษฐกิจยังคงเพิ่มขึ้นอย่างต่อเนื่อง อุตสาหกรรมการประมงของไทยกำลังเผชิญกับการแข่งขันที่รุนแรงขึ้นจากคู่แข่งรายอื่น การทำความเข้าใจความสามารถในการแข่งขันระดับโลกของประเทศไทยเป็นสิ่งสำคัญสำหรับอุตสาหกรรมประมง เพื่อให้สามารถแข่งขันได้อย่างสำเร็จ การศึกษานี้พยายามที่จะพิจารณาว่าตัวชี้วัดที่สำคัญ มีความสัมพันธ์อย่างมีนัยยะกับมูลค่าการส่งออก และนำเสนอวิธีการปรับปรุงความสามารถในการแข่งขันการส่งออกภาคประมงของไทย การศึกษาได้ตรวจสอบประสิทธิภาพการส่งออกซึ่งแสดงถึงฐานะความสามารถในการแข่งขันของภาคการประมง ได้แนวคิดมาจากแบบจำลองเพชรและวิธีการวิเคราะห์การถดถอยพหุคูณ ผลลัพธ์ที่ได้ชี้แจงปัจจัยกำหนดเนื่องจาก การเพิ่มมูลค่าสินค้า แรงงาน และ การลงทุนโดยตรงจากต่างชาติ มีผลในเชิงบวกต่อมูลค่าการส่งออกของปลาและผลิตภัณฑ์จากปลา ในแง่ของการขนส่งทางอากาศ ที่ควรคาดหวังในเชิงบวกแต่ผลลัพธ์แสดงผลกระทบด้านลบ การศึกษานี้สนับสนุนว่าอาจเหมาะสมสำหรับการปรับปรุงเงื่อนไขปัจจัยการผลิตในการพัฒนาแผนความสามารถในการแข่งขันเชิงกลยุทธ์ที่เกี่ยวข้องสำหรับการประมง โดยมุ่งหมายที่จะเพิ่มส่วนแบ่งตลาดการส่งออก และเพิ่มประสิทธิภาพการส่งออกของภาคการประมงของไทย



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Thailand has been one of the major exporters in the global fish market. As globalization and economic integrations continue to increase, the Thai fisheries industry is facing increasingly tough competition from other competitors. Understanding Thailand's global competitiveness is important for the fisheries industry there to compete successfully. The study seeks to determine whether significant indicators have a significant relationship to export value and to explore ways to improve Thai fisheries sector export competitiveness. This study of export performance as the competitiveness in the fisheries sector is obtained through Porter's diamond model and multiple regression method. The results clarify the determinants as the value-added, labor, and inward FDI has been positively effective to the exported value of fish and fish products. In terms of air-carried transportation, it is to be positively expected when the result shows a negative effect. This paper claims that it may be appropriate for improving factor conditions to develop a strategic competitiveness plan for the relevant fisheries, intending to potentially increase the export market share of the Thai fishery sector and increase its export performance.



Field of Study:	Business and Managerial Economics	Student's Signature
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Chapter 1 Introduction

1.1 Background

Thailand has been one of the major exporters in the global fish market. The potential of the Thai fishery in 2019 was 2,618,043 metric tons, with the value of marine resources gaining 172,285.4 million baht (Department of fisheries, 2019). ¹In the international market, with a share of around 1.5 % in the world of fish and fish product exports in 2019, the total exported volume was 1,546,182 tons, valued at 1,740 million US dollars. Thailand has become the top 10th Fish and fish product exporter after China, Norway, Vietnam, India, etc. (FAO, 2020). ²The significant products are canned tuna, shrimp, other prepared fishery and pet food canned. As global integration continues to increase, Thailand's fisheries industry is facing tougher competition from other competitors. Understanding Thailand's global competitiveness is essential for the fisheries industry there to compete successfully.

The global fisheries industry is one of the most interconnected food industries. The contribution of world aquaculture. There was estimated to have hit about 179 million metric tons in 2018 of global fish production, as it is shown in the figure 1, with a total first sale value estimated at USD 401 billion. To illustrate the figure 2 shows that the proportion of alternative ways of fish is reported to be consumed products from 1950 to 2018. In 2018, about 88 percent (or over 156 was used to provide food for direct human consumption, whereas the 12 percent which is about 22 million tons was remaining used for non-food purposes (FAO, 2020). Global fish consumption has been growing faster than population growth, indicating that people are increasingly consuming fish. The growth in consumption has been driven by both increased production and a variety of other factors. These include technological developments in processing, cold chain, distribution and shipping. As the worldwide incomes are rising, and this is having a big impact on the demand for fish and fish

¹ Department of fisheries. (2020, April 2). *Thailand Fisheries Overview*.

https://www4.fisheries.go.th/dof_en/view_message/215

² Food and Agriculture Organization of the United Nations. (2020). *Fisheries and Aquaculture*.

<https://www.fao.org/fishery>

product. Furthermore, a reducing loss and waste, as well as the consumers become more aware of the health benefits of fish, demand for fish will simultaneously continue to increase.

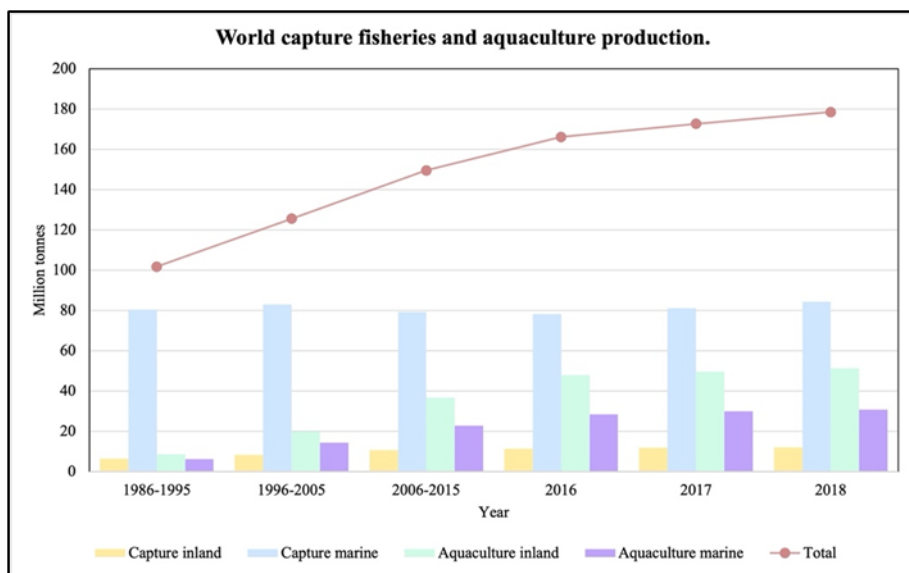


Figure 1: World capture fisheries and aquaculture production³.

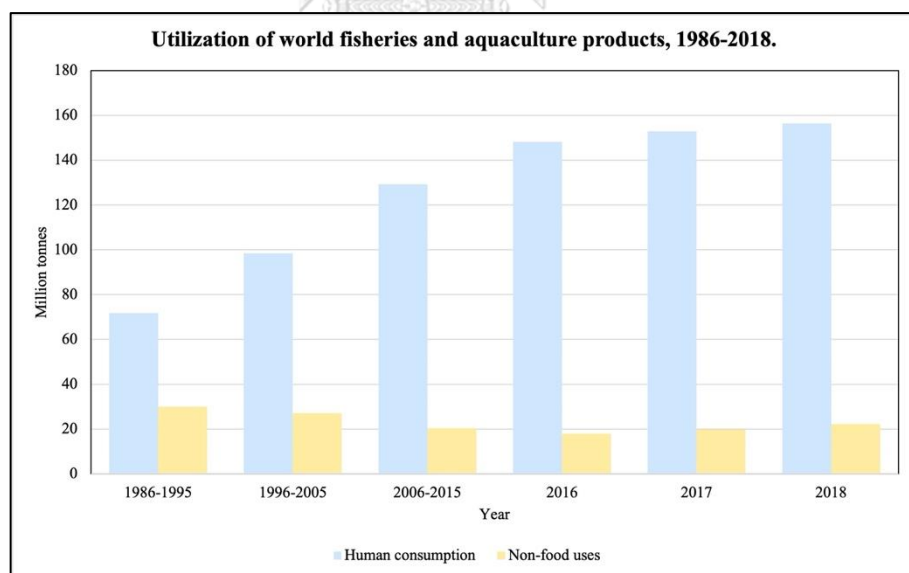


Figure 2: Utilization of world fisheries and aquaculture products, 1920-2019⁴.

³ Food and Agriculture Organization of the United Nations. (2020b). The State of World Fisheries and Aquaculture. https://www.fao.org/3/ca9229en/online/ca9229en.html#chapter-1_1

⁴ Food and Agriculture Organization of the United Nations. (2020c). Utilization of world fisheries and aquaculture product. https://www.fao.org/3/ca9229en/online/ca9229en.html#chapter-1_1

After about 50 years of rapid expansion, according to the figure 1 and 2, International trade confirms its important role as a driving force of economic growth and contribution to global food security. The global aquaculture sector has a significant impact on society today, along with the export of fish and fish products is a remarkable part of the economies of many countries and regions. The growth of international trade in fish and fishery products has been largely due to the increasing business activity that has taken place around the world over the past few decades, bolstered by the policies of globalization and liberalization. The share of merchandise trade in world GDP grew from 16.7 percent to 46.1 percent from 1960 to 2018 (World Bank, 2022). For the fisheries, aquaculture, and many other industries, progressive globalization can be reversed by trade volumes increase and prices for fish increase. According to Figure 3, the map shows the location of fish and fish product exporters and the value of their exports in 2019.

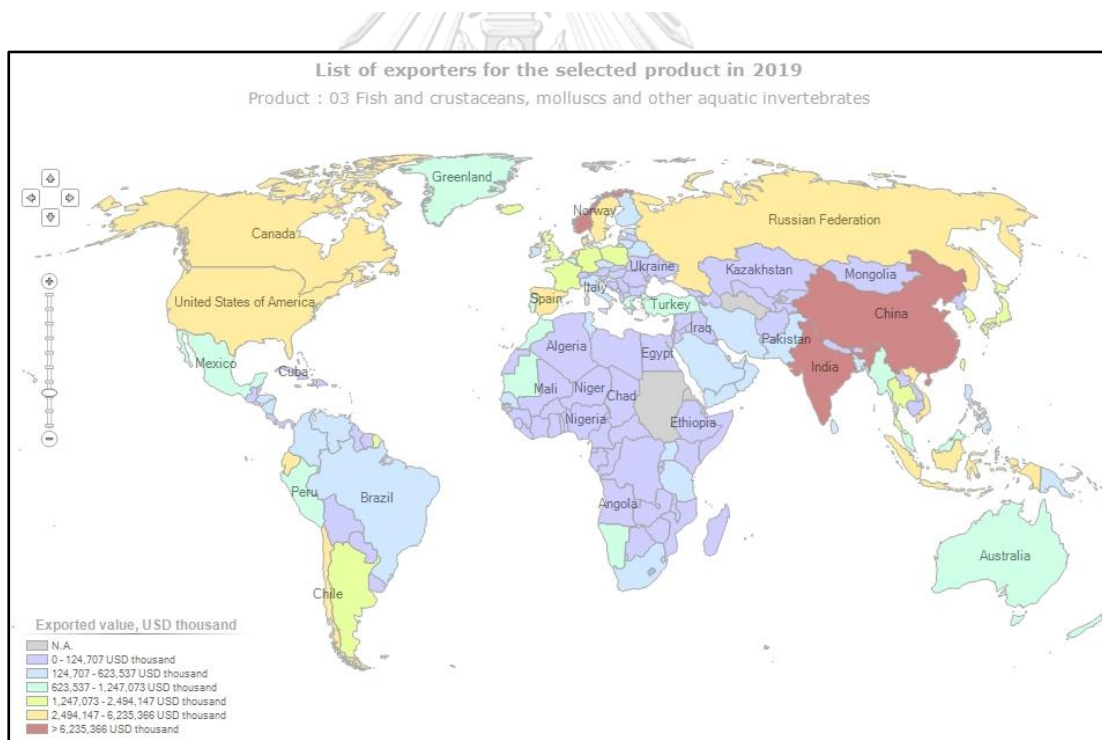


Figure 3: List of exporters for the selected product in 2019.⁵

⁵ International trade centre. (n.d.). List of exporters for the selected product in 2019. TRADE MAP.

International marketing campaigns have become a common occurrence as countries strive to broaden their exports. In this background, global competitiveness is pictured as a strategic phenomenon that pervades many business fields as international business, international management, and international marketing. The competitiveness of an organization depends on its attributes, which set it apart from other businesses in the global marketplace. The author, Porter, argues that this competitiveness is not something that is automatically inherited and can be created through a highly localized process. He explained the competitive edge can be characterized as four essential factors that allow an organization to outstrip its rivals (Porter, 1990). The Diamond Model of National Advantage is a system of attributes that collectively give a nation an edge in the economy. Each nation establishes its own Diamond Model, tailored to its own industries and needs. When each attribute is improved, the competitiveness of that nation will increase. This nation's international competitiveness and value it exports are both impressive.

Nevertheless, the fishing industry is a prevalent research topic in Thailand and previous literature on its international competitiveness is limited. This paper concentrates to fill this gap for analyzing the global competitiveness of Thailand's fisheries industry. However, some studies have explored truthfulness using the Diamond model and OLS. Therefore, this paper will emphasize the determinants based on the diamond model to estimate the effect on the exported value of fish and fish products. The objective is to identify whether significant indicators exist between them and, if they do, to quantify them. The paper is constructed as below. Subsequent to the introduction, the second part introduces the literature reviews and the framework used. The third part explains the methodology, selection of variables and data collection. In the next part, the paper offers the main empirical results on the exported value, which indicates the fisheries industry's international competitiveness and discussion. The final section of this paper provides some important conclusions and policy suggestion, which are essential for Thailand's fisheries industry to enhance its global competitiveness in the future.

1.2 Research questions

1. What determinants impact the export performance of fisheries and the aquaculture industry?
2. How to improve the international competitiveness in terms of export performance for the fisheries sector in Thailand?

1.3 Objective of the study

The main objectives of this study can be divided into two main areas. The first objective is to examine the effects of whether significant indicators have a substantial relationship with the exported value, while the second objective is to prospect to develop of the export competitiveness of the Thai fisheries sector in various aspects, whether it would positively or negatively influence each particular part.

1.4 Benefit of the study

The study of the effects of the factors based on the diamond model on aspects of international competitiveness across the country around the world. It will allow for an emphasis on the pieces of evidence which beneficial for the policy implementation and whether it would be worth it for the government to reinstate the provision in the future.

1.5 Scope of the study

This research observes the secondary empirical data in the year 2019 to emphasize the effect on export competitiveness. However, these global figures are exempted the exported value of trade in fisheries services such as consulting, infrastructure development, resource management, labeling, and certification, maintenance and research, and trade promotion and marketing services.

Chapter 2 Literature Review

2.1 Fisheries industry in Thailand

Fisheries and aquaculture have a highly significant social development, economic and nutritional role in Thailand. The country's long coastline provides benefits in two important bodies of water with 2,600 km, grounds in the Gulf of Thailand and in the Andaman Sea. Also, Inland waters cover approximately 3,750 km² (FAO, 2019). Thailand's fisheries production has been growing steadily over the years. In 2019, the exported fish value was at Baht 7,103 million US dollars. Thai seafood products are in high demand all over the world, with Japan, the United States, and Southeast Asia being the top markets. Shrimp products and canned tuna make up a large percentage of Thai seafood exports, accounting for 26% and 34% of total sales, respectively (Department of fisheries, 2019). Issues disputed such as the export competitiveness of Thai fishery products that problems in exporting fishery products were: (1) the shortage of shrimp raw materials due to the impact caused by the EMS epidemic and (2) The quantity of raw materials caught from the sea is limited, resources begin to decline, and the European Union are rigorously enforcing measures against illegal, unreported, and unregulated fishing (IUU). As results in a shortage of raw materials caught from the sea both in and outside Thai waters. (3) EU cuts right Generalized Scheme of Preferences (GSP). Subsequently, Thailand's competitiveness was significantly reduced in the EU market, and (4) the currency depreciated in major trading partners, including the EU and Japan. Causing an impact on the trading price of aquatic animal products (Phot, 2015)⁶. Moreover, the international trade barriers that prevent or restrict trade exert influence on the country's export performance. Choksuchad (2011) studied referring to the expansion of non-tariff trade measures of importing countries, such as volume restriction, hygiene measures and environmental measures, which affect operators such as increasing production costs because of following prescribed standards. Therefore, entrepreneurs need to improve and develop technology to produce products that meet the standards. If unable to adjust, it will reduce the competitiveness.

⁶ Aramwatnanna, P. (2014, December 22). *Export situation of Thai aquatic products in 2014 and trends in 2015*. Charoen Pokphand Foods. from <https://www.cpfworldwide.com/th/media-center/916>

Chaidee and Siriphatrasophon (2560)⁷ studied on competitive advantages of chilled and frozen shrimp exports in Thailand; in terms of production factors, Thailand has an advantage in production technology, farm management, production and cold storage management, and skilled labor but a disadvantage in production cost, high breeder prices and wages. For the condition of domestic demand, Thailand has a low domestic consumption of frozen shrimp because of the high price. Supporting and related industries, Thailand has an advantage in both shrimp nurseries and processing plants are constantly being updated, as well as the availability of transportation. For firm strategy, structure, and rivalry, Thailand has a technical aquaculture method advantage. In addition, obstacles that make them disadvantageous in competition, such as the impact of the disease outbreak in shrimp, higher oil prices, the appreciation of the baht, besides problems related to international trade measures and economic volatility. Jotikasthira (2019) studied the potential development of Thai seafood canned and processed food exports to southeast Asian countries by using the Comparative Advantage Analysis (RCA) concept. The study found that Thailand has a disadvantage in exporting shrimp to India and Vietnam. Thus, the fisheries industry of Thailand can compete with international competitors, its competitiveness in the whole fisheries sector is of considerable importance to understanding for developing the industry.

2.2 Competitiveness

The definition of "competitive" varies with the scope, context, and purpose of its use. It is a complex, multidimensional and relative concept, which has different relevance at different times and in different contexts. (Bhawsar and Chattopadhyay, 2015) Different researchers have attempted to study competitiveness from different angles, adding a new perspective to the subject. For instance, the Organization for Economic Cooperation and Development (OECD)⁸ accords the notion that

⁷ Chaidee, C., & Siriphatrasophon, S. (2017). The 4th National Conference on Public Affairs Management. In *Public Affairs Management Under Thailand 4.0* (pp. 593–607). Khon Kaen; Khon Kaen University.

⁸ OECD. (2014). *OECD Glossary of Statistical Terms - Competitiveness (in international trade) Definition*. <https://stats.oecd.org/glossary/detail.asp?ID=399>

competitiveness represents, the extent to which the country can produce goods and services for international competition while synchronously capacitating the growth of real domestic income and living standards in under favorable market conditions. Meanwhile, The World Economic Forum (WEF) ⁹determines international competitiveness as the ability of a country or company to generate more wealth than its competitors under a world market equilibrium condition. Thus, international competitiveness is achieved through the unification of our many competitive assets and the efficient use of our competitive procedures. There is a large body of literature on the concept of competitiveness as most of the contributions are based primarily on the theory of comparative advantage, which is constantly evolving from the theory of absolute initial advantages (AA) and comparative advantage (CA) of Adam Smith and David Ricardo. Porter's groundbreaking research on industrial competitiveness provides a new perspective on the issue, shifting the focus from traditional approaches as the theory of comparative advantage to the theory of competitive advantage. The new paradigm, that the Competitive advantage of nations, will help improve international competitiveness analysis. Therefore, a competitiveness was bolstered, with a growing body of research emphasizing the importance of the concept of competitiveness. The literature review demonstrates that there are a variety of ways to define competitiveness, depending on the purpose of the study. is a vital part of a nation's prosperity with the economic strength of a nation, industry or individual firm (Srivastava et al., 2006). There's been a shift in the way nations are trying to improve their competitive edge. (Mondal, 2012).

2.3 Export performance and international competitiveness

Multi-factor competitiveness indicators are generally seen as more complex than single-factor indicators. Due to factors that can help determine a given country's competitiveness and a more detailed understanding in the international context of its competitiveness structure, the focus of these indicators is narrowed one as exports and imports and export performance or cost-and-price relations. For example,

⁹ World Economic Forum. (n.d.). *The 12 pillars of competitiveness*. Global Competitiveness Report. <https://reports.weforum.org/global-competitiveness-report-2014-2015/methodology/>

Competitiveness Index (GCI) uses export volume development, whereas World Competitiveness Index (WCI) uses export growth rate development to be a measurement.

Consequently, due to the fact that globalization has become an indubitable reality, firms and hence, many countries have turned to expanding their export markets in order to increase their clout in the global marketplace to expand and strengthen their positions in the global trading field. Thus, export can be considered an important activity both at the firm, industry and country levels, given that the viability, development and competitiveness of the manufacturing sectors of many countries depend on access to world markets and their effective functioning. Bournakis & Tsoukis (2013) worked on an attempt to uncover the institutional determinants of export performance led them to conclude that structural competitiveness may also be necessary for export success. The higher export values and growth rates reflect a country's increased demand for its products, indicating its increased competitiveness (Sardy and Fetscherin 2009). Export marketing is becoming increasingly important as the industry grows in importance, with both policy makers and academia recognizing this as a priority (Lages et al., 2005).

2.4 Frameworks for assessing competitiveness of Fisheries industry

Among the models used to explain the competitiveness of countries or industries, the extensively used model is Michael Porter's Diamond Model, presented firstly in Porter (1990). According to this model, four main factors that contribute to a country's ability to maintain or gain a competitive edge are Factor conditions, Demand conditions, Firm Strategy, Structure and Rivalry, and Related and Supporting Industries. The framework also come up with chance and the government policies could be external factors that assisted the whole scheme of national competitiveness with the four characteristics mentioned above.

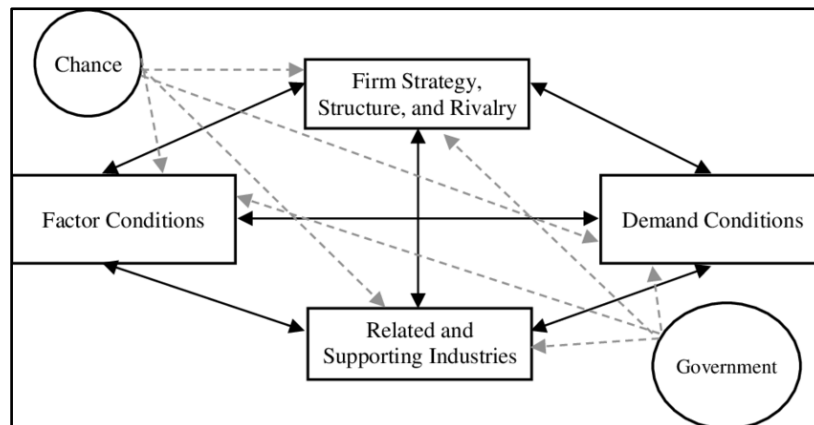
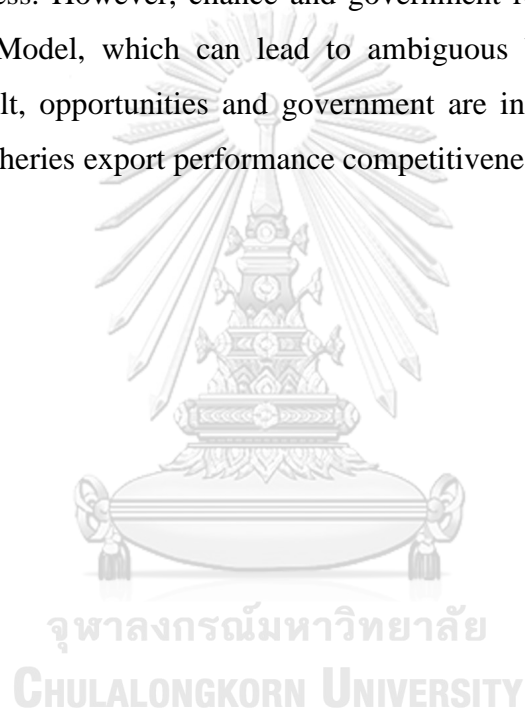


Figure 4: The diagram of Porter's diamond model illustrates the factors constituting¹⁰

1. **Factor conditions** refer to a nation's position in factors of production such as endowment with resources, capital investment, level of technology, and labor pool.
2. **Demand conditions** refer to the size and nature of the customers base for products. Countries can gain a competitive advantage in industries where there is a high demand for their products at home, as well as in industries where demanding buyers put pressure on companies to innovate more quickly and achieve greater competitive advantages than their foreign competitors.
3. **Firm strategy, structure, and rivalry** relate to the fundamental fact that competition drives companies to find new ways to produce more and develop innovative technologies. The concentration of degree of competition, market power, and ability of rival firms to enter a nation's market are important factors when considering whether or not a nation has a competitive market.
4. **Related supporting industries** refers to industries that are known for facilitating innovation by exchanging ideas, such as upstream industries and downstream industries. These can have a positive impact on knowledge sharing and innovation depending on the degree of transparency. The industries in the Diamond model correspond to those who can be either threats or opportunities for relating to each other.

¹⁰ Tsiligiris, V. (2018). An adapted porter diamond model for the evaluation of Transnational Education host countries. *International Journal of Educational Management*, 32(2), 210–226. <https://doi.org/10.1108/ijem-03-2017-0076>

The parts of "chance" and "government" in the diamond model are also critical to industrial competitiveness. The impact that chance and government have on fisheries market competitiveness is usually significant contrived by factor conditions, demand conditions, related firm strategy, structure and rivalry, and supporting industries. The main influence of government on the development of these four key factors is its ability to provide opportunities for encouragement and guidance. These factors contribute to the national environment in which companies, industries, and countries interact. Each point on the diamond represents an essential ingredient for international success. However, chance and government remain independent factors in the Diamond Model, which can lead to ambiguous boundaries between these factors. As a result, opportunities and government are incorporated into four main elements in our fisheries export performance competitiveness analysis framework.



Chapter 3 Research Methodology

3.1 Methodology

This paper aims to determine the indicators that impact the export performance, which represent the international competitiveness of the fisheries industry and assess the national competitiveness of Thailand's fisheries industry. In this regard, a methodology, Porter's Diamond Model, helps quantify nation competitiveness. The study of industry competitiveness has been broadly applied by investigating the mutual influences between internal and external elements and their effects on the industry as a whole in a country. This study will use the four essential components of the model to explain the relationship with competitiveness.

3.1.1 Porter's Diamond model

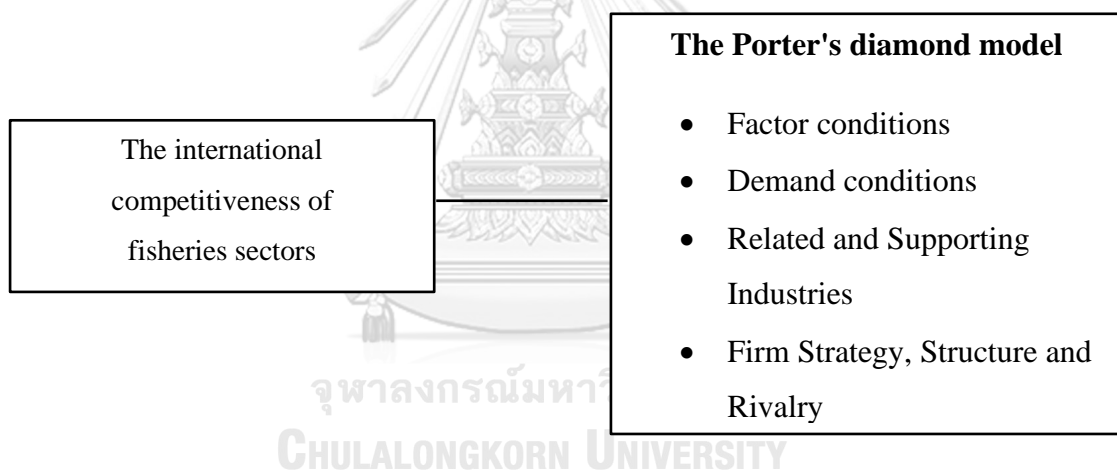


Figure 5: The attributes for determination of the international competitiveness of fisheries sector

The diamond model has been modified to provide an analytical framework for the competitiveness of the fisheries sector. The indicator system in our article contains a set of indicators that combines factors that both drive and hinder fisheries and aquaculture development, as well as impede it in Table 1.

Table 1: The theoretical framework for assessing fisheries competitiveness which is based on the Diamond Model.

Philosophical factors	Definition	Supporting indicators	Proxies
Factors, conditions	These elements provide the necessary resources in the factors of production in Fisheries industry	Resource endowments, capital input, labor, and advance technology	<ul style="list-style-type: none"> • Value-added • Employment in fishing and aquaculture • FDI inflows
Demand conditions	The market demand for fisheries products	Market scale	<ul style="list-style-type: none"> • Total population • GDP per capita
Related and supporting industries	The competitiveness of supplier industries and related industries is an international component.	The industries that exert strong influences on the fisheries industry are vital to its continued prosperity.	<ul style="list-style-type: none"> • Container Port Traffic • Air transport departures
Firm strategy, structure, and rivalry	The structure and management of domestic fisheries firms as well as their performance against rivals.	Firms' strategy, management, and competitiveness in the global market	<ul style="list-style-type: none"> • Ease of doing business score

1. Factors, conditions

According to Porter (1990), the factor conditions include both basic and advanced factors. fundamental factors refer to natural resources, unskilled labor, and semiskilled labor that are rooted and required investment to be took advantage of production. Advanced factors such as highly skilled workers, and research &

development (R&D), meanwhile, it is created and upgraded by reinvestment and innovation.

Three proxies are used to assess the Factor Conditions (Table 1). Since fisheries is a labor-intensive industry, the paper selects labor-related brokers, including (1) the number of workers and laborers in the fisheries and aquaculture industry to represent the primary factor conditions. A large number of workers indicates an abundance in workforces, which can be a motivation for industrial expansion and therefore highly competitive. (Sardy and Fetscherin, 2009). (2) value-added, some studies also showed that the domination of low-value products makes it difficult to compete with products from other countries, given their superior quality and features. (Kusumastanto, 2008; Talukdar & Hazarika 2017). The assessment of international factors is based on (3) inward FDI, shows the foreign investment in the domestic market. Due to the lack of sector-specific data on inward and outward FDI, it is difficult to say for certain which sectors are most active in this area. Then, the unified data of agriculture, forestry and fishing inward are used instead. The more inward FDI, the higher the country's international market competitiveness. (Popovici & CĂLIN, 2015).

2. Demand conditions

Porter (1990) highlighted the role of size and sophistication of domestic demand in shaping competitiveness. During the time, the high demand for homes is causing businesses to expand their production in order to take advantage of economies of scale and to innovate for meeting the high demands in terms of product quality and variety. In this paper, (4) the number of total populations is taken to represent the size of domestic market demand. (5) GDP per capita, they are well-explained proxies to illustrate the domestic demand on the market scale, we used data from the census.

3. Related and supporting industries

Sardy and Fetscherin (2009) addressed that related and supporting industries are imperative for an industry's ability to compete in the international market. If an industry has a competitive advantage in supporting industries, it is more likely to be successful. According to explanation from Porter (1990), the related and supporting industries attributes refer for ensuring that the country is able to compete internationally. They comprise the downstream and upstream firms as well as

combining the supporting infrastructure as transportation involved in the value chain. In today's globalization, international transportation and communication play an important role in promoting the competitiveness of an industry, by facilitating international trade transactions and increasing multinational activity levels. (Vu and Pham, 2016). Therefore, (6) a container port traffic, and (7) the number of registered air departures worldwide were used to perform the capacity to ship goods abroad. The registered air departures provide information on the number of domestic takeoffs and takeoffs abroad of air carriers registered in the country.

4. Firm strategy, structure, and rivalry

This characteristic reflects the context in which companies are created, organized and managed, and the local competition environment. Another aspect to focus on is rivalry and regard it as the most important factor in a country's or industry's competitive advantage. The national competitive advantages are optimized from a good business environment (Liu and Hsu 2009). In this paper, (8) Ease of doing the business score, the ease of doing business score measures an economic performance in terms of good regulatory practice across a sample of 41 indicators across 10 Doing Business topics. This measurement is developed by the World Bank, which can be a proper proxy for the domestic business context.

3.1.2 Conceptual Framework

The conceptual framework is depicted in Figure 6, which includes eight explanatory variables. value-added, labor in the fisheries industry, and inward foreign direct investment, which are identified as the factors of the endowment. The market scale represents the number of total populations in each country and GDP per capita. Also, container port traffic and carrier air transport departures are related industries. Ease of doing the business score is shown in the domestic business context in each country. These variables are provided based on the categories in the diamond model to examine the impact on international competitiveness in terms of exported value, particularly in fisheries and the aquaculture industry.

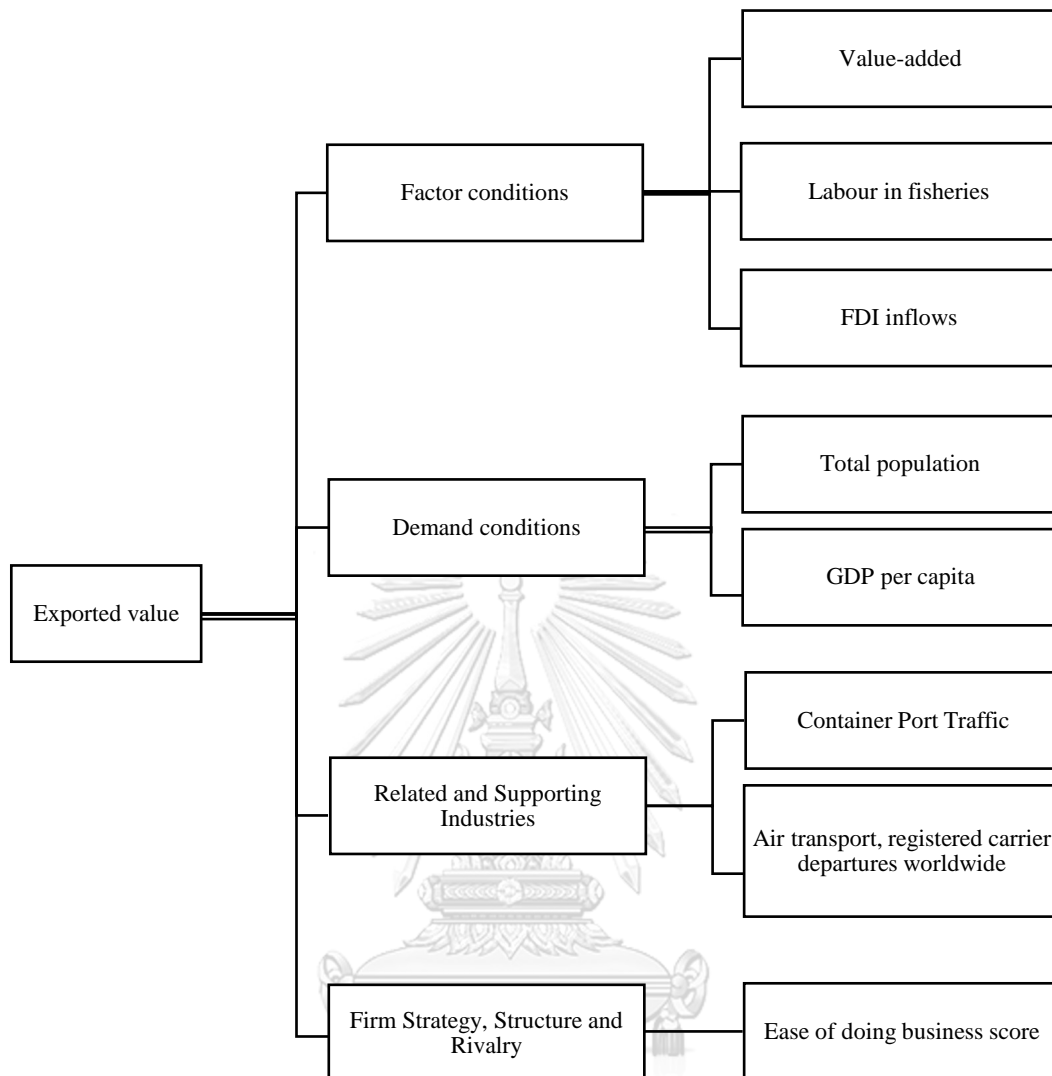


Figure 6: The conceptual framework.

3.1.3 Multiple regression analysis

Multiple regression is a statistical method used to analyze relationships between two or more variables. It is an extension of the OLS regression model, which is a widely used tool for predicting outcomes. Multiple linear regression is used to model the linear relationship between one or more explanatory variables and a response variable. Many researchers use this technique to determine the macroeconomic variables and estimate the relationship with export performance. Hence, this study will utilize this method to estimate the economic model constructed based on the diamond model. To show the impact of determining factors on the international competitiveness in terms of the fisheries industry's exported value.

Accordingly, the multiple regression methods will be obtained when it meets BLUE criteria (Best Linear Unbiased Estimator) to validate all of the classic assumption testing.

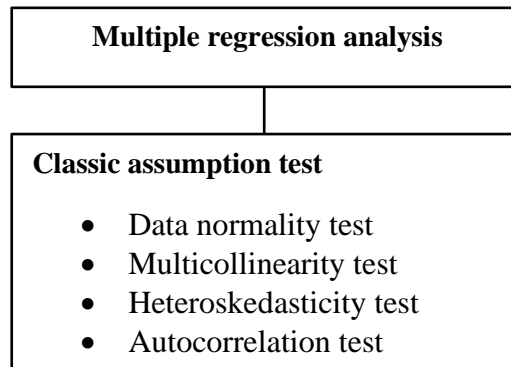


Figure 7: The classic assumptions of multiple regression analysis

1. Data normality test

A normality test is a test to determine if a set of data is distributed in a way that is typical for data from a normal distribution. Plotting histograms can observe the data's normality; nonetheless, it is not apparent to detect visually. Therefore, the Jarque-Bera test is a deviation from normality fitting test that relies on sample skewness and kurtosis to supplement the visual assessment of normality.

The statistical hypothesis of this test is

H_0 : The sample is typically normal distributed.

H_a : The sample is not normally distributed.

The following formula can calculate the test statistic

$$JB = \frac{n}{6} \left(s^2 + \frac{(K - 3)^2}{4} \right)$$

Where:

S = the sample skewness

K = the sample kurtosis

n = the sample size

If the $p > 0.05$, we fail to reject the null hypothesis, which means that the sample is normally distributed.

If the $p \leq 0.05$, we reject the null hypothesis that the sample is not a normal distribution.

1. Multicollinearity test

Multicollinearity is a statistical concept in which several independent model variables are correlated. The occurrence of correlation among multiple independent variables is high in a model predicting the outcome. The existence of multicollinearity in a data set can lead to less reliable results due to more significant standard errors.

Multicollinearity can be disclosed by observing the correlations only among pairs of independent variables. Anyhow, It is limited because the correlation between two variables may be too small while there is a linear relationship between other variables. Hence, to check multicollinearity, use the Variance Inflation Factor (VIF) for each independent variable. It is a measure of how closely the values of multiple regression variables are related. The higher the VIF value, the higher the correlation between that variable and the rest of them, which can be calculated by the following equation:

$$VIF_i = \frac{1}{(1 - R_i^2)}$$

Where R_i^2 = the unadjusted coefficient of determination for regression the i as independent variable on the remaining one.

The maximum value for the VIF statistic is ten, so if the value is greater than ten, there is significant multicollinearity present. (Gujarati & Porter, 2009).

2. Heteroscedasticity test

The heteroskedasticity refers to the error variance that can be dependent on the scattering plot within a minimum of one independent variable and predicted value. The heteroskedasticity is a violation of the assumptions for linear regression modeling, and so it can impact the validity of the econometric analysis. A cone graph shape pattern is created and embodied in either direction, left to right and vice versa. The heteroskedasticity occurs in the model since increasing the predicted values leads to an increase in the residual, whereas if it does not happen, then heteroskedasticity does not present in the model.

The presence of heteroskedasticity can be exposed by the Breusch-Pagan test, and the hypothesis of this test is:

H_0 : *Homoscedasticity is present*

H_a : *Heteroscedasticity is present*

Calculated by the following equation:

$$n * R^2 \text{ (with } k \text{ degrees of freedom)}$$

Where:

n = sample size

R^2 = a coefficient of determination which is the regression of squared residuals from the authentic regression.

k = number of independent variables.

If the $p > 0.05$, we failed to reject the null hypothesis, which means that there is no heteroskedasticity in the model.

Whereas the $p \leq 0.05$, we deny the null hypothesis, meaning that heteroskedasticity occurs in the model.

3. Autocorrelation test

Autocorrelation refers to the degree of correlation between two successive sets of data. It measures how the late version of a variable's value relates to its original version in a time series. There are two types of autocorrelations: positive and negative. The correlation between two variables can range from -1 (perfectly negative correlation) to 1 (perfectly positive correlation). A positive autocorrelation means that a rise of observed in a time interval leads to a proportionate increase in the lagged time interval. Conversely, negative autocorrelation leads to the increase observed in a time interval leads to a proportionate decrease in the lagged time interval. To diagnose this problem, the Durbin-Watson statistic is often used to test this. However, in this study, we study the cross-section data; hence we will not be involved with the autocorrelation testing.

3.2 Data Collections

The data used in this study are secondary data from 2019, covering 40 countries across the globe, obtained from publicly available sources through the World Bank, the Food and Agriculture Organization of the United Nations (FAO), and the international labor organization (ILO) and Trade map.

The World Bank Group is a vast and diverse partnership of five institutions with two of the five institutions dedicated to the International Development Association, and the International Bank for Reconstruction and Development.

Forming the World Bank which “provides financing, policy advice, and technical assistance to governments of developing countries” ¹¹(World Bank, n.d.). The total population, GDP per capita, container port traffic, air transport and ease of doing business score used in this study is obtained from the World Bank database.

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to address food insecurity (FAO, n.d.). ¹²Meanwhile, FAO is responsible for gathering statistical information on food and agriculture, which is essential for understanding the world’s food supply and improving the quality of life for people. This work is a key part of FAO’s mandate. The data obtained from the FAO includes data on value-added and FDI inflows to agriculture, forestry and fishing.

The International Labour Organization is a venerable institution that strives for social justice and the respect of internationally recognized human and labor rights. (ILO, n.d.). ¹³Labor statistics act a crucial role in the efforts of working to deepen understanding of common problems, explain actions and mobilize interest. The data used in this study is obtained in the area of employment in fishing and aquaculture.

Trade Map was developed by the International Trade Centre UNCTAD/WTO (ITC) with monitoring both national and product-specific trade performance, strategic market research, revealing comparative and competitive advantages, and identifying the potential for the market to both firms and trade support institutions. (Trade map, n.d.). ¹⁴The exported value in the product for category 03, including fish and crustaceans, Mollusca, and other quartic invertebrates, is collected from this source.

To conduct this research, the dependent variable in the model is the exported value of fisheries products. The explanatory variables include the value-added, labor

¹¹ World Bank. (n.d.). *WHO WE ARE*. Worldbank. <https://data.worldbank.org/>

¹² Food and Agriculture Organization of the United Nations. (n.d.). *About FAO*. FAO. <https://www.fao.org/home/en>

¹³ International Labour Organization. (n.d.). *About the ILO*. ILO. <https://www.ilo.org/global/about-the-ilo/lang--en/index.htm>

¹⁴ International Trade Centre. (n.d.). *About Trade Map*. TRADE MAP. https://www.trademap.org/stAbout_tradeMap.aspx?nvpm=%7c%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c2%7c1%7c%7c1

in the fisheries industry, inward foreign direct investment, total populations, GDP per capita, container port traffic, carrier air transport departures and ease of doing the business score.

Table 2: Description of indicators and source of data in the year 2019.

Variables	Indicators	Denote	Description	Unit	Source
Dependent variable	Exported value	Export	Exported value in product category 03, including fish and crustaceans, Mollusca, and other quartic invertebrates.	Thousand US dollar (US\$)	Trade map
Independent variables	Value-added	VA	Value Added in Agriculture, Forestry and Fishing as a net output of the sector which is the sum of all outputs and the subtraction of all intermediate inputs.	Millions of US dollars (US\$)	FAO
	Labors in fishing and aquaculture	FLabor	The total number of labor forces who participate in the fisheries industry	1000 persons	ILO
	FDI inflows	InFDI	FDI inflows to Agriculture, Forestry and Fishing	Millions of US dollar (US\$)	FAO
	Total population	POP	Total population is based on the actual definition of population, which counts the entire population regardless of legal status or citizenship.	Unit	World bank

	GDP per capita	GDPCap	GDP per capita is the gross domestic product divided by the average annual population.	US dollar (US\$)	World bank
	Container Port Traffic	PT	Port container traffic measures the flow of containers between land and sea transport modes.	Unit	World bank
	Air transport, registered carrier departures worldwide	AD	The number of registered carrier departures worldwide includes domestic takeoffs and takeoffs abroad of air carriers registered in the country.	Unit	World bank
	Ease of doing business score	BS	The ease of doing business is a measure of how well an economy is performing with respect to regulatory requirements. It ranges from 0 to 100, with 0 representing the worst regulatory performance and 100 the best.	Unit	World bank

Table 3: The descriptive statistical summary of the data

Variables	Mean	Median	S.D.	Min	Max	Obs.
Exported values	2779934.70	1704600	2743426.12	190446	12470733	40
Value-added	67800.89	15413.22	187544.72	539.84	1065300.14	37
Labors in fishing and aquaculture	228.70	26.39	428.79	2.42	1465.26	18
FDI inflows	98.99	0	330.83	-35.12	1840	39
Total population	120987625	32510462	306274715	48677	1407745000	39
GDP per capita	30034.64	21232.29	24717.92	1743.30	80886.62	38
Container Port Traffic	16988127.21	5756000	40906371.39	6145	245103781	39
Air transport, carrier departures	816466.77	498878	1727461.77	0	10099031	39
Ease of doing business score	74.84	77	8.62	51	87	37

Table 3 shows the summary statistic of the used sample size in the analysis, several differences are distinct when comparing the means of our variables of interest across different types of diamond indicators, and there are high volatilities since a high value of the standard deviation among the variables as well.

Table 4: Correlation Matrix of the Explanatory Variables

	VA	FLabor	InFDI	Pop	GDPCap	PT	AD	BS
VA	1.000							
FLabor	0.634	1.000						
InFDI	0.043	0.015	1.000					
Pop	0.934	0.630	0.058	1.000				
GDPCap	-0.204	-0.296	0.008	-0.250	1.000			
PT	0.868	0.416	-0.017	0.684	-0.057	1.000		
AD	0.495	0.258	0.171	0.456	0.194	0.544	1.000	
BS	0.049	-0.059	0.017	0.011	0.655	0.165	0.282	1.000

The correlation matrix of the explanatory variables depicts the correlation between each of the explanatory variables. Correlation shows how strongly two variables are related, be it linearly or nonlinearly. A high but not perfect correlation between the explanatory variables may create a problem of Multicollinearity, where estimates of the regression may be wrong, and variables may become significant or change signs after another variable is dropped from the model. The correlation matrix shows that two pairs of variables, value-added and population, have a very high but not perfect correlation which is 0.934 might lead to the problem of multicollinearity. This issue will be addressed in chapter 4 of the study.

Chapter 4 Result and Discussion

4.1 Economic model

The model used in this study is constructed based on the international competitiveness hypothesis, as well as a number of selected indicators based on the diamond model. Besides these assumptions, the analysis designs a simple linear regression, and the baseline model is the following:

$$Export = \beta_0 + \beta_1 VA + \beta_2 FLabor + \beta_3 InFDI + \beta_4 Pop + \beta_5 GDPCap + \beta_6 PT + \beta_7 AD + \beta_8 BS + \varepsilon$$

4.2 Empirical result

Results from regression estimation are shown in Table 5, showing regression results from the linear model based on each criterion of the diamond model and their variables that represent in Figure 8.

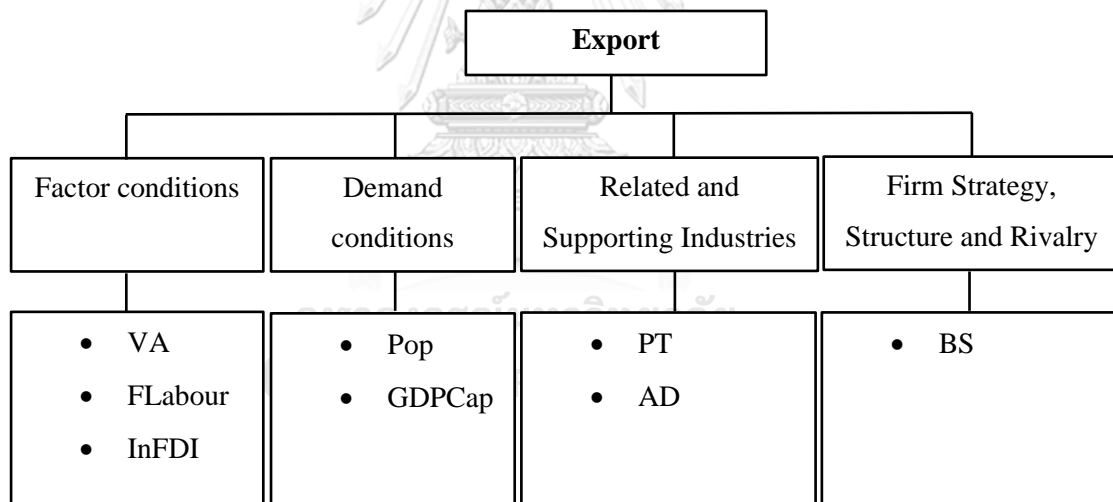


Figure 8: The predicted indicators that affect to export performance in diamond model's attributes.

Table 5: Multiple regression estimation analysis summary for diamond model indicators and predicting export performance.

Variables	Model: Factor conditions		Model: Demand conditions		Model: Related and Supporting Industries		Model: Firm Strategy, Structure and Rivalry	
	Adjusted R ² : 0.702034 (n = 17)		Adjusted R ² : 0.341807 (n = 38)		Adjusted R ² : 0.249537 (n = 39)		Adjusted R ² : 0.002932 (n = 37)	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Const	1.52e+06	0.01***	1.42e+06	0.03**	2.09e+06	0.00***	-1.39e+06	0.74
Value-added	2.71	0.55						
Labors in fishing and aquaculture	2136.86	0.09*						
FDI inflows	9060.83	0.00***						
Total population			0.06	0.00***				
GDP per capita			23.79	0.14				
Container Port Traffic					0.03	0.01**		
Air transport, carrier departures					0.27	0.33		
Ease of doing business score							57293.8	0.30

Note: *p < .10; **p<.05; ***p<.01.

The regression estimation of the linear model in the categories of the Dimond model, which presents in figure 8, the factor conditions with FLabor is significant at 10 percent significant level, and InFDI is significant at 1 percent significant level. For the demand conditions as Pop is significant at a 1 percent significant level. The related and supporting industries shows that PT is significant at a 5 percent significant level. Although the BS is founded, that does not become to be significant for the firm

strategy, structure and Rivalry. In a superior way to understand the effects of export competitiveness, each element can relate to others, and we will perform across variables in the multiple linear regression for estimation models.

Table 6: Regression estimation with model 1.

Variables	Model 1	
	Adjusted R ² : 0.807004	
	(n = 17)	
	Coefficient	P-value
Constant	2.46728e+06	0.5419
Value-added	-57.1137	0.3153
Labors in fishing and aquaculture	1492.80	0.2729
FDI inflows	11129.3	0.0006***
Total population	0.0215702	0.2772
GDP per capita	25.6339	0.3239
Container Port Traffic	0.226095	0.0674*
Air transport, carrier departures	-1.27793	0.0270**
Ease of doing business score	-30896.0	0.6130

Note: *p < .10; **p<.05; ***p<.01.

With the first model from the table 6, it does not present problems to disobey normality and heteroskedasticity assumption. Anyhow, there could be existed a multicollinearity problem in this model as it shows the strong correlation between two variables between VA and Pop presented in table 7. Such a problem could lead to wrong estimations from the regression, and the model has to be discarded. The study will perform the Variance Inflation Factors (VIF) test to address the violation. As the result, there exists a multicollinearity problem since the values > 10.0 may indicate a collinearity problem as VA_P, Pop, PT and AD. Hence, the results from the VIF test confirmed the concerns over a multicollinearity problem. Regarding the problem that could be found, to address this issue, some variables must be dropped from the model.

According to validate in multicollinearity issue from the VIF test in model 1, hence some of the variables have to be dropped from the model. Hence, leaving the specification of the model to be in the following table 7 and 8. In addition to multicollinearity, heteroskedasticity is a real concern. With heteroskedasticity, the variance of the error term does not have the same value given any value of the explanatory variables. To account for heteroskedasticity, the regression will be run with robust standard errors.

Table 7: Regression estimation using robust standard errors with model 2 and 3.

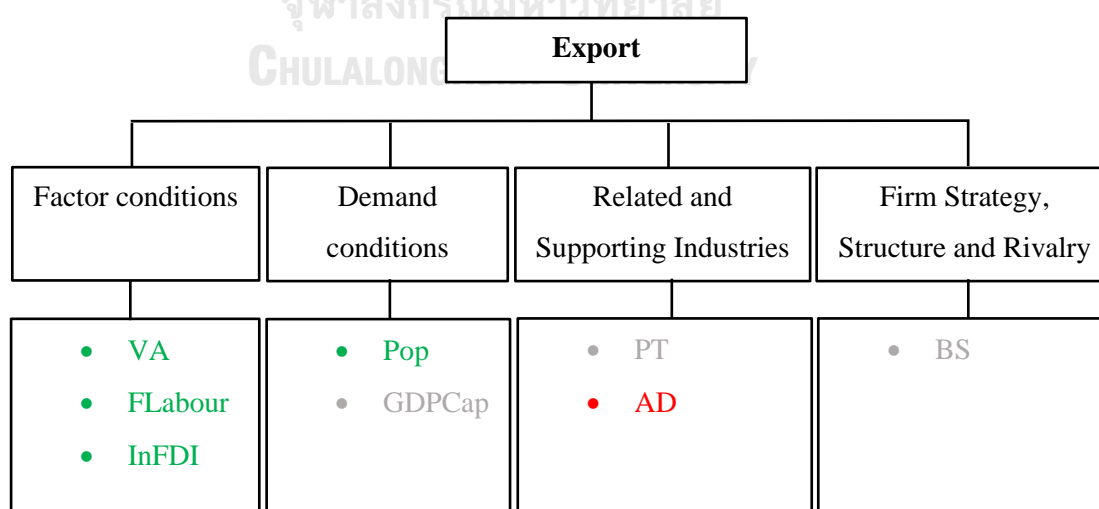
Variables	Model 2		Model 3	
	Adjusted R ² : 0.690725 (n = 17)		Adjusted R ² : 0.693184 (n = 17)	
	Coefficient	P-value	Coefficient	P-value
Constant	2.00098e+06	0.6936	1.97453e+06	0.6976
Value-added	4.06735	0.0224**		
Labors in fishing and aquaculture	3189.87	0.0021***	3131.18	0.0023***
FDI inflows	8030.30	0.0022***	8083.33	0.0020***
Total population			0.00148022	0.0085***
GDP per capita	30.0449	0.2731	29.6922	0.2760
Container Port Traffic	-0.0581438	0.1385	-0.0546245	0.1534
Air transport, carrier departures				
Ease of doing business score	-13018.2	0.8567	-12551.6	0.8618

Note: *p < .10; **p<.05; ***p<.01.

Table 8: Regression estimation using robust standard errors with model 4 and 5.

Variables	Model 4		Model 5	
	Adjusted R ² : 0.759328 (n = 17)		Adjusted R ² : 0.745330 (n = 17)	
	Coefficient	P-value	Coefficient	P-value
Constant	1.97215e+06	0.6830	-1.00097e+06	0.8156
Value-added	4.85915	0.0004***		
Labors in fishing and aquaculture	3007.56	0.0004***	2358.00	0.0003***
FDI inflows	8781.38	0.0001***	10045.6	1.56e-06***
Total population			0.00161996	0.0006***
GDP per capita	34.3195	0.1440		
Container Port Traffic				
Air transport, carrier departures	-0.437850	0.0002***	-0.359919	8.96e-05***
Ease of doing business score	-17160.2	0.7999	35838.7	0.5372

Note: *p < .10; **p<.05; ***p<.01.



Note: Green: Positive effect, Red: Negative effect, Gray: not significant

Figure 9: The summary of significant indicators that affect to export performance.

Correspondingly to the results, it summarized that what each indicator has an impact on the exported value as the green shows the positive effect, red: negative effect and gray is not significant. And all of variables in factor conditions have positive effect.

According to table 7 and 8, the adjusted R^2 is a corrected goodness-of-fit for model accuracy that it seeks to determine how reliable the correlation is and how much it is determined by the addition of independent variables. The regression estimation results show that linear model 4 has the highest Adjusted R-squared value of the others, meaning it indicates a model that has well predictive value. Therefore, the specification of the model will be:

$$Export = \beta_0 + \beta_1 VA + \beta_2 FLabor + \beta_3 InFDI + \beta_4 GDPCap + \beta_5 AD + \beta_6 BS + \varepsilon$$

In addition, to address the aggregation bias problem in panel data economics that leads to inaccurate parameter estimates by using a method that takes into account the violations of OLS assumption with normality, heteroscedasticity and collinearity tests, respectively.

4.2.1 Test for Violations of the OLS Assumptions

1. Normality test

The data distribution of residuals in this model shows on the histogram (Figure 10) that is employed to investigate the normality assumption. Seeing that the distribution is not very nonnormal, we are able to use the Jarque-Bera test use as a result shown in table 9.

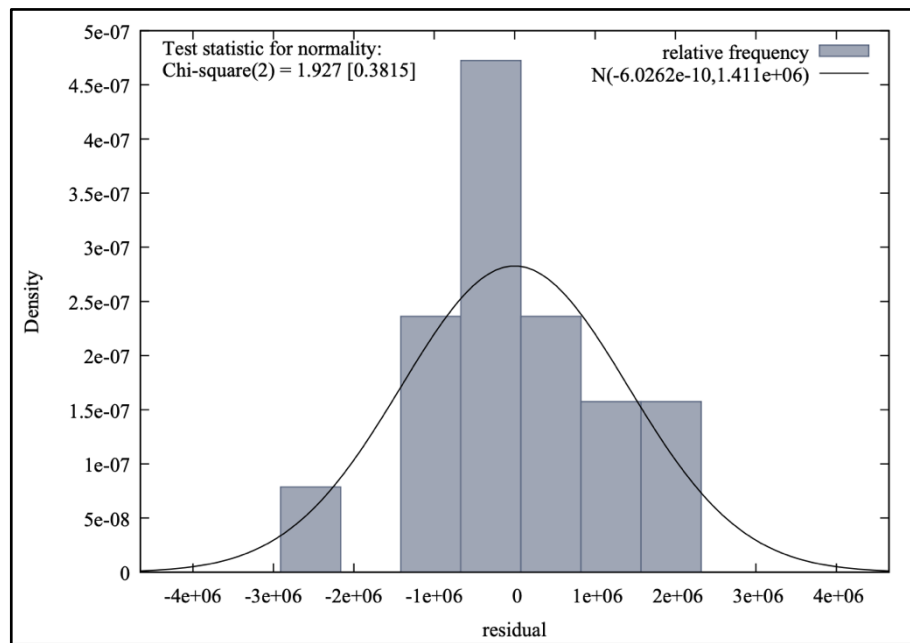


Figure 10: The diagram of test statistical for normality of residuals

Table 9: The result for normality of residuals of model 4

Model	Test statistics	P-value
4	1.927	0.38153

According to Table 10, the result of normality testing shows that the test statistic is 1.93 and the P-value is 0.38. This means that there is a high probability that the statement is true, we cannot reject the null hypothesis (H_0) at a five percent significant level and represents to have a normal distribution in this scenario.

2. Heteroscedasticity test

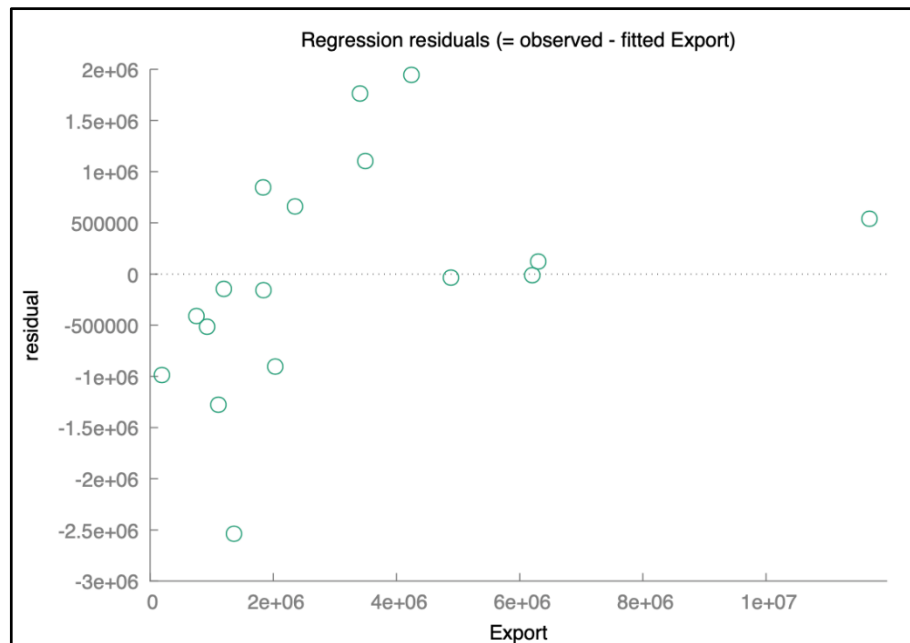


Figure 11: The residuals plot against the predicted export value

The graph illustrated that the residuals plot against the predicted export value to check the heteroscedasticity problem in this model. It is not presented in a cone shape pattern. However, to barely account for heteroskedasticity, the study will conduct the Breusch-Pagan test; the result will show in the following table.

Table 10: The Breusch-Pagan test result for Heteroscedasticity test

Model 1	Test statistics	P-value
4	2.576298	0.859833

In the test performed for heteroskedasticity in model 4, with a 2.58 test statistical value, the null hypothesis that the variance is constant will fail to reject at the 5 percent significance level since the P-value is 0.86, which is more than 0.05. Therefore, heteroscedasticity is not present in this model.

1. Multicollinearity test

To test whether multicollinearity remains after adjusting for potential confounding factors, since such a problem could lead to wrong estimations from the regression, and the model has to be discarded. The study will perform the Variance Inflation Factors (VIF) test to address the violation.

Table 11: Summary of Variance Inflation Factors (VIF) of model 4

Model	Variables	VIF
4	Value-added	1.797
	Labors in fishing and aquaculture	2.105
	FDI inflows	1.731
	GDP per capita	3.617
	Air transport, carrier departures	1.568
	Ease of doing business score	2.151

From the result in Table 11, It could be seen that the VIFs indicate that the independent variables have a lower value than was intended (<10), so the consisting multicollinearity problem is disappeared.

The final fitted model for fisheries industry competitiveness and the corresponding standardized coefficient. The estimated model and its coefficients are

Estimated Export Value

$$\begin{aligned}
 &= (1.97215e + 06) + (4.85915[VA]) + (3007.56[FLabor]) \\
 &+ (8781.38[InFDI]) + (34.3195[GDP Cap]) - (0.437850[AD]) \\
 &- (17160.2[BS]) + \varepsilon
 \end{aligned}$$

Or,

Estimated Export Value

$$\begin{aligned}
 &= (1.97215e + 06) + (4.85915[Value - added]) \\
 &+ (3007.56[Labors in fisheries]) + (8781.38[FDI inflows]) \\
 &+ (34.3195[GDP per capita]) - (0.437850[Air departures]) \\
 &- (17160.2[Ease of doing business score]) + \varepsilon
 \end{aligned}$$

The regression estimation of the linear model 4 while dropping Pop, PT and BS to account for multicollinearity and using robust standard errors to account for heteroskedasticity yielded four significant variables: VA, FLabor, InFDI and AD at one percent significance level, and their coefficient have respectively 4.86, 3007.56, 8781.38 and -0.44 values. When there is an increase in one index, the corresponding variable also increases. If the former increased by 1, result to the increment of the variable is equal to the index as:

- Holding all other explanatory variables constant, if VA or Value-added increases by one Million US\$, the exported value of fish and fish products will, on average, increase by 4.85915 thousand US\$.
- Holding all other explanatory variables constant, if the labor forces in the fisheries sector increase by one thousand people, the exported value of fish and fish products will, on average, increase by 3007.56 thousand US\$.
- Holding all other explanatory variables constant, if inward foreign direct investment in agriculture, forestry and fishing increases by 1 million US\$, the exported value of fish and fish products will, on average, increase by 8781.38 thousand US\$.
- Holding all other explanatory variables constant, if the number of registered air carriers increases by 1 unit, the exported value of fish and fish products will, on average, decrease by 0.44 thousand US\$

4.3 Discussion

Considering the effect of Value-added, Labor forces in the fisheries sector, and Inward foreign direct investment to agriculture, forestry, and fishing have a positive effect on the exported value of fish and fish products and their fisheries competitiveness. The fish processing industry is becoming more highly competitive and increasingly expensive, and as a result, one possible way to improve profitability is to add value to the products that they produce. This suggests that as the value-added on fish or fish products increase with hygienically prepared and promoted with a quality label can fetch higher prices and are willing to pay from the customers (Geethalakshmi et al., 2013). The establishment of value-added processing facilities is likely to lead to their increasing dominance in the international trade in fishery products. This is because these facilities can provide better quality and safety controls. The positive relationship between labor forces and exported value is to be expected, as those in Fishing-related industries employ a vast majority of people in developing countries, especially those in labor-intensive occupations with a growing number of employees could lead to larger production and exported value. Furthermore, as the amount of labor input into this sector increases, so does the level of production as well as innovation and human rights should be considered to improve their productivity which is the unstoppable trend in the development of an industry.

A more optimistic view has emerged about the aspect of foreign direct investment (FDI) in the export performance of the host country which suggests that it can help improve the export performance of a country. Iwamoto and Nabeshima (2012) claimed that Foreign direct investment (FDI) inflows are positively associated with both export diversification and sophistication. Furthermore, providing support for the successful transfer of opportunities to local people and their creation. This would imply that inward FDI has a positive relationship to exported value. However, the coefficient of Air transport, registered carrier departures is negative as the number of air-carried planes increases, and the exported value of fish and fish products falls. Due to the transportation facing the challenges of water quality and its deterioration imposed on the fish, this is reflected in the cumulative mortality during simulated transportation and has to ensure a better transport environment. (Promod et al., 2011). As a result, course loss in export. This result is contradictory to Khasanah et al. (2019)

views that the grouper fisheries are heavily driven by export markets, and there needs to be more oversight of air and at-sea cargo exports.

The application to the export competitiveness of the fisheries sector in Thailand can be settled in the context of factor endowments or factor conditions. Due to the result, it can be seen that there is a positive relationship between factor conditions and export performance which includes value-added, labor, and inward foreign direct investment involved in the fisheries industry. The marine and fishery sector has a comparative advantage that is very dependent on natural resources. Jiwapibantanakit (2021) claimed that the production volumes of Thai shrimp are declining due to the limited supply of raw materials caught from the sea caused to fisheries resources are dwindling. Hence, the value-added on the fish product comes to support an increase in the exported value. However, the low competitiveness of exports from the fishery sector is due to the fact that many products in this sector have low value-added, making them difficult to compete against products from other countries. (Kusumastanto, 2008). To get better performance of how the value-added can improve effectively in Thailand's fisheries sector, it is necessary to first knowledgeable understand food preservation and processing to create added value since the research shows that there is a weakness lacking in know-how from Thai fisheries (Ausponpandh et al., 2021). In addition, the advance in technology and innovation should deliver to enhance the efficiency and effectiveness of fisheries production. In a study of blockchain implementation in the Thai fish industry, it was found that blockchain-centric food supply chains have the potential to improve the resilience of fishery ecosystems and help achieve sustainable development goals. (Tsolakis et al., 2021).

Thailand has a large pool of low-cost labor, which helps offset the country's weaknesses in productivity. Despite the many positives, certain key problems exist in the Thai fisheries industry as labor issues and unacceptable working conditions for workers in industrial fisheries. Since the United States downgraded Thailand to "Tier 3" in the US's Trafficking in Persons Report (TIP Report), then it rose to the "Tier 2 Watch List" to be the same level as the Asia competitors as India, Indonesia, and Vietnam. In addition, the EU placed Thailand in the group of countries that received a "yellow card" under the IUU Fishing criteria for illegal fishing, as nowadays, this

status is disappeared. By the way, it affects the image of Thai fisheries' products in the export market. As a result, the value of frozen seafood exports in Thailand decreased at a rate that was greater than the decrease in the world market (Sowcharoensuk, 2020)¹⁵. The important factor of endowment as the labor force in the Thai fisheries industry is required the new labor standard and traceability for moving towards sustainability within supply chains in Thailand (Kadfak and Widengård, 2022). Foreign direct investment in fisheries, aquaculture, and industries related to fishing is important and necessary for Thailand. The research shows that, over a long period of time, increasing fish production leads to a better trade balance and more inward foreign direct investment. (Alshubiri, Elheddad and Doytch, 2020). Local and foreign investors should be encouraged to invest in opportunities in fishing and aquaculture sectors that employ many local workers. These sectors provide many opportunities for job growth and generate revenue for the local economy.

Overall, the fundamental factor endowments as the factor conditions with value-added, labor forces, and FDI in Thailand should be considered to improve the Thai exported value of fish and fish products. A lack of effective management and governance of trade and fishing can lead to unsustainable practices, and Thailand is trying to alleviate this problem by building the capacity of fishing communities and managing their resources. As previously stated, there are many flaws within the fisheries and aquaculture schemes, and improvements can be made in many areas to enhance the quality of care and standard of fish products and labor working conditions. As well as an investment incentive is likely to be a magnetic one that enhances the competitiveness of the Thai fisheries industry.

¹⁵ Sowcharoensuk, C. (2019, July 25). *Industry Outlook 2019-2021: Processed Seafood*. Krungsri Research. <https://www.krungsri.com/th/research/industry/industry-outlook/Food-Beverage/Processed-Seafood/IO/io-froccessed-seafood-20-th>

Chapter 5 Conclusion and Recommendations

5.1 Conclusion

The inspection of export performance as a measure of competitiveness in the fisheries sector among evidence from different countries around the world. This study obtained Porter's diamond model and multiple regression method to clarify the determinants that impact the export performance of fisheries and the aquaculture industry. The indicators are embodied in four broad areas as captured in the diamond model: (1) factor conditions, (2) demand conditions, (3) Related and supporting industries, and (4) firm strategy, structure, and rivalry. The effects discovered from these research and studies show that the value-added, labor, and inward FDI have been positively effective to the exported value of fish and fish products. In terms of air-carried transportation, it is to be positively expected when the result shows a negative effect. There are many factors that contribute to competitiveness. Successful economic development is the process of making incremental improvements to the business environment so that more sophisticated ways of competing can be achieved. Therefore, if one is able to overcome the perceived notion of the competitiveness being enlargement, they will be able to see that it is perhaps an effective policy that is able to accomplish its intended purpose in the Thai fisheries industry.

In order to enhance all of the four attributes, the international competitiveness of the fisheries industry is of crucial importance. Efforts must be made to improve the industry's ability to compete in the global marketplace. Nonetheless, this paper argues that the task of improving Factor Conditions by investing in training workers and educating high-skilled laborers in the appropriate working environment, we can improve productivity and create value addition to the product, also attract the FDI inflow to the country. Otherwise, the results of this study may suggest that reallocating domestic resources and enhancing national production activities are likely to be favorable for policymakers. The study's findings may be appropriately helpful in devising competitiveness strategic plans for the fisheries involved, potentially flourishing to increase export market shares and raise the export performance of fisheries sectors in Thailand.

5.2 Policy suggestion

Findings provide some supportive perspectives in terms of policy implications to improve international competitiveness for Thai fisheries sector; 1) improving the product quality and lower the production costs in order to promote the competitiveness of fishery products, 2) supporting the development of value-added products, 3) improving the working conditions and focusing on resolving illegal labor and human trafficking issues in the fisheries and aquaculture industry, 4) promoting investment.

5.3 Limitation and recommendations

Limitations to the study do exist. The study only looks at a single time period, 2019, and a total of 40 countries. Without observing the development of the countries through time, it may be more difficult to spot the value only fisheries sector in some variables such as the value-added and inward FDI which the data from agriculture, forestry and fishing were used instead of those specifically for the fisheries industry. In addition, the study only accounts for 17 out of the total since the specific availability of data in terms of the labor force in the fisheries sector is shortage. However, the study employs this variable due to the direct effects on this sector. In countries such as China and Chile, the top 10 fish and fish product exports in the world are missing from the study. If a larger sample size can be obtained, the results may become more representative of the actual competitiveness of the export performance. This deficiency will be resolved when the data issue is addressed. In addition, future studies may take into account some other indicators related to fisheries such as the exchange rate, which is an important indicator to directly affect export performance, to provide better perspectives on Thailand's competitiveness in the fisheries and aquaculture industry.

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