TRADE PERFORMANCE OF FISHERY INDUSTRY IN MALAYSIA

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag
ASEAN	Association of Southeast Asian Nations
AMG	Augment Mean Group
BLUE	Best Linear Unbiased Estimator
CAGR	Compound Annual Growth Rate
CE	Competitiveness Effect
CEFTA	Central European Free Trade Agreement
CEP	Comparative Export Performance
CIS	Commonwealth of Independent States
CMS	Constant Market Share
CMSC	Constant Market Share Competitiveness
CMSS	Constant Market Share Space
COVID-19	Coronavirus disease 2019
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Cum of Squared
DOFM	Department of Fisheries Malaysia
DOSM	Department of Statistics Malaysia
DSMN	National Food Security Action Plan
EIR	Export-Import Ratio
EPD	Export Product Dynamic
EU	European Union
FAF	Food, Agriculture and Forestry
FAMA	Federal Agricutural Marketing Authority
FAO	Fish and Agriculture Organization
FDI	Foreign Direct Investment
FE	Fixed Effects
FGLS	Feasible Generalized Least Squares
FishStat	FAO Fisheries Statistics
FRED	Federal Reserve Economic Data
FTB	Trade Coverage

FTC	Fish Trade Competitiveness
FXA	Fish Export Advantage
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GE	Growth Effect
GL	Grubel Lloyd
GMM	Generalized Method of Moments
HS	Harmonized System
IDR	Import Dependency Ratio
IMP3	Third Industrial Master Plan
IPS	Institut Pengajian Siswazah
ITC	International Trade Centre
IUU	Illegal, Unreported and Unregulated
LFI	Lafay Competitive Advantage
MAFI	Ministry of Agriculture and Food Industries
MIDF	Malaysian Industrial Development Finance Berhad
MLC	Marshall-Lerner Condition
MPRT	Ministry of Primary Resources and Tourism
NAP 2.0	National Agrofood Policy 2.0
NARDL	Nonlinear Autoregressive Distributed Lag
NEC	not elsewhere included
NEXI	Net Export Index/Trade Balance Index
NRCA	Normalized Revealed Comparative Advantage
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCSE	Panel-Corrected Standard Errors
PP	Phillips-Perron
RC	Revealed Competitiveness
RCA	Revealed Comparative Advantage or Relative Export Advantage
RCEP	Regional Comprehensive Economic Partnership
RE	Random Effects
REER	Real Effective Exchange Rate
RESET	Ramsey Regression Specification Error Test

RMA	Relative Import Advantage
RMCD	Royal Malaysian Customs Department
RO1	First Research Objective
RO2	Second Research Objective
RO3	Third Research Objective
RO4	Fourth Research Objective
RO5	Fifth Research Objective
RSCA	Revealed Symmetric Comparative Advantage
RTA	Relative Trade Advantage
SDG	Sustainable Development Goals
SEAFDEC	Southeast Asian Fisheries Development Centre
SMECORP	Small and Medium Enterprise Corporation Malaysia
SME	Small and Medium-sized Enterprises
SPA Fisheries	Strategic Plan of Action for ASEAN Cooperation on Fisheries
SPV	Shared Prosperity Vision
SSL	Self-Sufficiency Level
STIP	Seafood Trading Intelligence Portal
TC	Trade Competitiveness
TRD	Trade Balance
UN	United Nations
UK	United Kingdom
US	United States
USM	Universiti Sains Malaysia
VAR	Vector Auto-Regression
VECM	Vector Error Correction Model
WAEMU	West African Economic Monetary Union
WTO	World Trade Organization
XCI	Export Competitiveness Index
12MP	Twelve Malaysia Plan

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PRESTASI PERDAGANGAN INDUSTRI PERIKANAN DI MALAYSIA

ABSTRAK

Walaupun Malaysia ialah ekonomi terbuka kecil yang dikelilingi lautan, Malaysia masih mengalami masalah defisit perdagangan ikan yang serius. Ini menunjukkan industri perikanan Malaysia mungkin kehilangan kelebihan eksport dan daya saing perdagangan di peringkat global. Isu ini telah menarik perhatian daripada penggubal dasar kerana ia menimbulkan ancaman kepada kestabilan ekonomi, sekuriti makanan dan prestasi perdagangan di Malaysia. Objektif umum kajian ini adalah untuk menilai prestasi perdagangan industri perikanan di Malaysia, dan dibahagikan kepada lima yang khusus. Pertama, untuk mengukur kelebihan eksport ikan Malaysia berdasarkan *Revealed Comparative Advantage*, *Revealed Symmetric Comparative Advantage*, *Normalized Revealed Comparative Advantage* and *Comparative Export Performance (CEP)*. Kedua, untuk mengkaji faktor-faktor seperti penggunaan dan pengeluaran ikan yang mempengaruhi *CEP* pada 2001-2020, menggunakan pendekatan *Autoregressive Distributed Lag (ARDL)*. Ketiga, untuk mengukur daya saing perdagangan ikan Malaysia berasaskan *Relative Trade Advantage*, *Revealed Competitiveness*, *Trade Competitiveness*, *Export-Import Ratio* and *Trade Coverage (FTB)*. Keempat, untuk mengkaji faktor-faktor seperti keterbukaan perdagangan, pekerjaan perikanan, susut nilai kadar pertukaran dan pendapatan asing yang mempengaruhi *FTB* pada 1976-2018, menggunakan pendekatan *Nonlinear Autoregressive Distributed Lag (NARDL)*. Kelima, untuk mengukur daya saing eksport ikan Malaysia ke destinasi berhampiran utama melalui *Constant Market Share Competitiveness (CMSC)* dan *Constant Market Share Space (CMSS)*. Hasil kajian mendedahkan bahawa industri perikanan Malaysia kehilangan kelebihan eksport (e.g.,

$CEP < 0$) dan daya saing perdagangan (e.g., $FTB < 1$) pada 2016-2020. Penggunaan ikan memberi kesan negatif manakala pengeluaran ikan mempunyai kesan positif terhadap *CEP* dalam jangka pendek, oleh itu mengesahkan teori *Keynesian* dan *comparative advantage*. Pendekatan *NARDL* pula membuktikan kesan asimetri jangka pendek dan jangka panjang keterbukaan perdagangan terhadap imbangan perdagangan. Pekerjaan perikanan juga memberi kesan positif kepada imbangan perdagangan (mengikuti teorem *Heckscher-Ohlin*) manakala susut nilai kadar pertukaran dan pendapatan asing memberi kesan negatif. Untuk jangka panjang, kedua-dua pendekatan ini menunjukkan bahawa semua faktor ini membawa kesan yang bertentangan. Kadar pertukaran menyokong teori *J-curve* manakala kesan positif pendapatan asing mengikuti teori *Keynesian*. Akhirnya, *CMSC* dan *CMSS* melaporkan bahawa eksport ikan Malaysia menpunyai daya saing terkuat di Thailand dan ikan beku tetapi paling lemah di Singapura dan krustasea. Insiden-insiden ini banyak disebabkan oleh pergantungan terhadap import ikan dan kekurangan kapasiti eksport ikan. Untuk cadangan polisi, kerap mengadakan kempen Beli Barangan Buatan Malaysia, pengurusan pengeluaran yang lebih baik dengan peningkatan kualiti, menyemak semula dasar perdagangan dan kadar pertukaran, penggunaan sains dan teknologi, duti eksport ikan yang lebih rendah, serta tumpuan terhadap pasaran Thailand dan kumpulan ikan beku amat disyorkan untuk meningkatkan prestasi perdagangan ikan Malaysia.

TRADE PERFORMANCE OF FISHERY INDUSTRY IN MALAYSIA

ABSTRACT

Although Malaysia is a small open economy surrounded by ocean, it still faces critical fish trade deficit, implying that Malaysian fishery industry might lose its export advantage and trade competitiveness globally. This issue has drawn greater attention of policymakers as it poses threats to the Malaysian economic stability, food security and trade performance. The general objective of this study is to evaluate the trade performance of fishery industry in Malaysia, and is divided into five specific ones. First, to measure Malaysian fish export advantage through Revealed Comparative Advantage, Revealed Symmetric Comparative Advantage, Normalized Revealed Comparative Advantage and Comparative Export Performance (CEP). Second, to examine factors (i.e., fish consumption and fish production) affecting CEP for 2001-2020, adopting the Autoregressive Distributed Lag (ARDL) approach. Third, to measure Malaysian fish trade competitiveness through Relative Trade Advantage, Revealed Competitiveness, Trade Competitiveness, Export-Import Ratio and Trade Coverage (FTB). Fourth, to investigate factors (i.e., trade openness, the exchange rate, fishery employment, and foreign income) affecting FTB in 1976-2018, using the Nonlinear Autoregressive Distributed Lag (NARDL) approach. Fifth, to measure the competitiveness of Malaysian fish exports to the prime neighbouring destinations through the Constant Market Share Competitiveness (CMSC) and Constant Market Share Space (CMSS). The findings reveal that Malaysian fishery industry has lost its export advantage (e.g., $CEP < 0$) and trade competitiveness (e.g., $FTB < 1$) for 2016-2020. Fish consumption has a negative effect whereas fish production carries a positive effect on the CEP in the short-run, hence following the Keynesian and

comparative advantage theories. The NARDL approach evinces the short- and long-run asymmetric effects of trade openness on FTB. Fishery employment also positively affects FTB (upheld the Heckscher-Ohlin theorem) while depreciation and foreign income adversely affect it. For longer term, both approaches show that all the variables exert an opposite effect. The exchange rate's outcome confirms the J-curve effect whereas the positive effect of foreign income validates the Keynesian theory. Eventually, the CMSC and CMSS show that Malaysian fish exports reflects the strongest competitiveness in Thailand and frozen fish but the least in Singapore and crustaceans. These incidents are mainly due to fish import reliance and lacking fish export capacity. For policy recommendation, more Buy Malaysian Product campaigns, a better production management with quality enhancement, revisiting trade and exchange rate policies, more science and technology adoption and lower fish export duties, with more concentration on the Thailand and frozen fish are highly recommended to enhance Malaysian fish trade performance.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Fisheries constitute one of the most globalized food industries. As a fisheries nation, Malaysia has been recognized as one of the major producers of marine products, ranking 14th and 5th in captured fisheries (1.45 million tonnes) in the world and Association of Southeast Asian Nations (ASEAN), respectively, in 2018 (Fish and Agriculture Organization (FAO), 2020b). According to the same source, Malaysia is also the 7th highest in aquaculture production of aquatic algae (174.1 thousand tonnes) in the world and the 3rd in ASEAN. Since fishery industry is one of the main agriculture sub-sectors, it has been also identified as the Gross Domestic Product (GDP) growth accelerator (Yusoff and Arshad, 2017), indicating that the fishery industry forms the basis of the Malaysian economy. For instance, agriculture sector registered 7.4% of total Malaysia GDP in 2020, where fishery industry is the fourth contributor (i.e., accounted for 11.2%) in the agriculture sector (Department of Statistics Malaysia (DOSM), 2021b). The agriculture and fishery industries have been given priority with an allocation of RM1.7 billion and RM150 million for catch incentives for fishermen under Malaysian Budget 2022 based on Ministry of Agriculture and Food Industries, henceforth MAFI (2022a). In 2020, Malaysian fish exports (i.e., an important source of foreign currency) and fish imports worth USD 619.30 million and USD 919.95 million respectively (International Trade Centre (ITC), 2021a, 2021b). The industry also helps to rural livelihood development through the provision of protein source (or food) and income-generating opportunities of poor rural communities in which it offered 15,107 employments in Malaysia (DOSM, 2019). The Self-Sufficiency Level (SSL) and the consumption of fish recorded 95.3% and 42.7kg/capita, respectively, in

2020, implying that Malaysia produces a high supply of this commodity to meet the local demand for fish, despite reliance on fish imports (Nordin *et al.*, 2019; MAFI, 2020) . These figures underlined the importance of the fishery industry (in terms of national economy, trade, rural development, employment and food security) in Malaysia.

The United Nations (UN) Sustainable Development Goals (SDG), namely, Industry, Innovation and Infrastructure (SDG 9) and Responsible Consumption and Production (SDG 12), are highly relevant to the development of fishery industry owe to the specifics of the fishery resource base, which has both a self-reproducing function and the ability to cultivate the resources by agricultural methods (Yarkina and Logunova, 2021; Global Seafood Alliance, 2022). Based on the same sources, the former seeks to build resilient infrastructure, promote sustainable industrialization and foster innovation whereas the latter is to ensure sustainable consumption and production patterns. As per DOSM (2021d), Malaysia started to participate in the development of SDG in late 2014 with the involvement of Economic Planning Unit that is responsible for the national blueprint, namely Shared Prosperity Vision (SPV) 2030 and Twelve Malaysia Plan (12MP). Besides, food processing sector (includes fish and fishery products) have been targeted for further development and promotion of resource-based manufacturing sectors under Third Industrial Master Plan (IMP3) that aims to achieve long term global competitiveness through transformation and innovation of the manufacturing and services sectors (Ministry of International Trade and Industry, 2006). Aligned with these frameworks, main fisheries policies such as National Agrofood Policy 2.0 (NAP 2.0) for 2021-2030, National Food Security Action Plan (DSMN) for 2021-2025, Tuna Industry Development Strategic Plan for 2021-2030, National Plan of Action to Prevent, Deter and Eliminate Illegal,

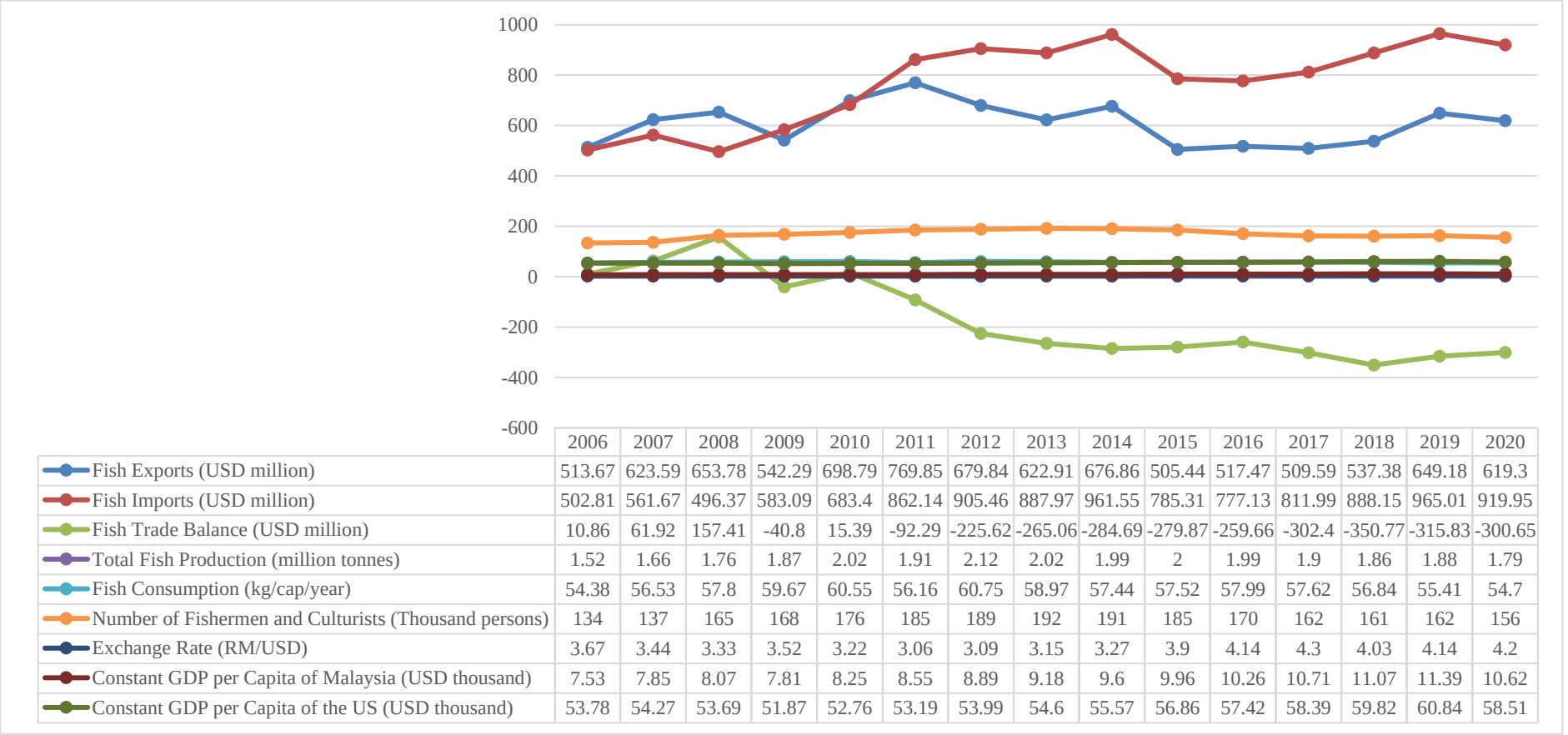
Unreported and Unregulated Fishing (NPOA-IUU) and National Plan of Action for the Management of Fishing Capacity Plan 2 (NPOA 2) are implemented to ensure sustainable development and improve production, competitiveness, trade, fishermen's income and reducing dependency on food imports of the industry. More efforts in enhancing the industry covers participation in trade through, namely, the Strategic Plan of Action for ASEAN Cooperation on Fisheries (SPA Fisheries) for 2021-2025.

In this increasingly open world economy, competitiveness creates job opportunities in the export sectors, then enhances the national development. Measuring export advantage and trade competitiveness of a nation can help in understanding the country's trade performance and benchmarking its strengths and weaknesses. Based on Lafay 1992 (cited in Bojnec and Fertő, 2017), the differences between export advantage and trade competitiveness may seem trivial on the surface but their concepts are different. Export advantage (trade competitiveness) means the relative success or failure of the efforts of a country to sell more domestically produced goods and/or services in other countries (than its purchase of foreign goods from other countries) by using export-only (export-and-import) indices such as Revealed Comparative Advantage (Revealed Competitiveness), henceforth RCA (RC) (Khai, Ismail and Sidique, 2016; Bowen, 1983, cited in Saricoban and Kaya, 2017). Importantly, the adoption of (more measurements of) both export advantage and trade competitiveness strengthens the outcomes of trade performance of the country (Khai, Ismail and Sidique, 2016; Soh, Lim and Chua, 2022b). Hence, export advantage and trade competitiveness become a central preoccupation (World Bank, 2018).

Most interestingly, trade balance, which refers to net foreign demand for domestic goods (i.e., calculated as exports minus imports), is a simple measurement

of trade competitiveness (Jing, Mu and Mohsin, 2018). From Figure 1.1, during 2006-2008, Malaysia has an increasing trend of fish trade surplus where the exports exceed the imports, in which the existence of trade competitiveness in the fishery industry is likely to be led by rising fish production, fishermen and culturists as well as fish consumption that is driven by higher domestic income and appreciation of the exchange rate, respectively. Then, the situation has been reversed since 2009 when Malaysia, an open economy, experienced the full effect of the 2008 international financial crisis, which was brought by the United States (US) subprime mortgage crisis, in the first quarter of 2009 as the snowballing recession in the developed economies amplified the effect of a plummeting global demand on fish trade, production and investment activities in Malaysia and may have left lasting scars on our economy (Bank Negara Malaysia, 2009; Chen, Mrkaic and Nabar, 2018; Lee, 2020). As proof, Malaysia has faced a critical fish trade deficit, where fish imports are increasingly greater than the exports since 2009 (Tay, 2018; DOSM, 2021c; Malay Mail, 2022; Soh, Lim and Chua, 2022a), implying the lacking export advantage and trade competitiveness upon the industry (MAFI, 2021a; Soh, Lim and Chua, 2022a). This issue has drawn greater attention of Ministry of Agriculture and Agro-based Industries Deputy Minister, Ministry of Agriculture former Deputy Minister and Marine Fish Farmer Association Malaysia Deputy President because it poses threats to the Malaysian economic stability, food security and competitive position in international fish trade (Tay, 2018; MAFI, 2021a; Malay Mail, 2022). In other words, when Malaysia persists to import more fish than it exports, the resulting serious fish trade deficit is detrimental to GDP (i.e., according to the Keynesian model), food security and food bill (i.e., because fish trade deficits make the nation vulnerable to sharp price fluctuations on the fishery market) as well as competitiveness in the

international fish trade (i.e., since decreasing fish production is unable to meet rising demand from local and foreign countries) (Jing, Mu and Mohsin, 2018; World Bank, 2019; MAFI, 2021a; Wong, 2021). To prevent the issue from getting worse, Halal Industry Development Corporation former Chief Executive Officer and Malaysian Industrial Development Finance Berhad (MIDF) research promote the development of the industry (Whitehead, 2020; MIDF, 2022). The persistent fish trade deficit may be resulted from an overall decline in the fish production (i.e., since 2012) and the number of fishermen and culturists (i.e., since 2013). High fish consumption, especially on imported fish is also likely to cause the serious trade deficit (Chan, 2017; Nordin *et al.*, 2019). The country's trade is always closely linked to its exchange rate in which the currency changes can substantially affect earnings, expenditures and trade competitiveness of fisheries that are highly traded (Asche, 2014). In Figure 1.1, Ringgit appreciated from 2009 to 2011, and then it depreciated until 2017 and appreciated again in 2018, ultimately depreciated again until 2020. Ringgit appreciation might cause local goods to be relatively more expensive, reducing the fish exports and raising the fish imports; hence fish trade balance becomes negative or vice versa. Also, theoretically, when people have higher income, they generally demand more food. The demand for fish is also sensitive to the income level of consumers, thus changes in the domestic income will affect the demand for fish. As Malaysian income rose from 2009, it probably leads to higher demand for both local and imported fish, causing fish trade deficit. Malaysia also trades fish with the US, that has been the world largest fish importing country and amongst the Malaysian dominant fish export markets (ITC, 2021a). The relatively higher income of the US has increased its demand for (Malaysian) fish, allowing Malaysia to broaden the exports and finally enhancing Malaysian fish trade balance.



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fish Exports (USD million)	513.67	623.59	653.78	542.29	698.79	769.85	679.84	622.91	676.86	505.44	517.47	509.59	537.38	649.18	619.3
Fish Imports (USD million)	502.81	561.67	496.37	583.09	683.4	862.14	905.46	887.97	961.55	785.31	777.13	811.99	888.15	965.01	919.95
Fish Trade Balance (USD million)	10.86	61.92	157.41	-40.8	15.39	-92.29	-225.62	-265.06	-284.69	-279.87	-259.66	-302.4	-350.77	-315.83	-300.65
Total Fish Production (million tonnes)	1.52	1.66	1.76	1.87	2.02	1.91	2.12	2.02	1.99	2	1.99	1.9	1.86	1.88	1.79
Fish Consumption (kg/cap/year)	54.38	56.53	57.8	59.67	60.55	56.16	60.75	58.97	57.44	57.52	57.99	57.62	56.84	55.41	54.7
Number of Fishermen and Culturists (Thousand persons)	134	137	165	168	176	185	189	192	191	185	170	162	161	162	156
Exchange Rate (RM/USD)	3.67	3.44	3.33	3.52	3.22	3.06	3.09	3.15	3.27	3.9	4.14	4.3	4.03	4.14	4.2
Constant GDP per Capita of Malaysia (USD thousand)	7.53	7.85	8.07	7.81	8.25	8.55	8.89	9.18	9.6	9.96	10.26	10.71	11.07	11.39	10.62
Constant GDP per Capita of the US (USD thousand)	53.78	54.27	53.69	51.87	52.76	53.19	53.99	54.6	55.57	56.86	57.42	58.39	59.82	60.84	58.51

Figure 1.1 Malaysian fish trade balance, number of fishermen and culturists, exchange rate and constant GDP per capita of Malaysia and the United States (US), 2006-2020

Source: Department of Fisheries Malaysia (DOFM), 2021; FAO Fisheries Statistics (FishStat), 2022; Federal Reserve Economic Data (FRED), 2022; World Bank, 2022a)

Over the last decade, the rapid growth of international fish trade has occurred due to globalization and large-scale world economy transformation, resulting from trade openness and technological advancement (FAO, 2018). Trade openness (i.e., measured by the total of nominal of exports and nominal of imports, then divided by nominal GDP) is the main source of economic growth and development (Hajilee and Niroomand, 2019), particularly through more competition (Ghani, 2009). While Malaysian trade openness has been declining recently, it is still above 100% (World Bank, 2022b), meaning that the economy is more dependent on international demand (Koen *et al.*, 2017). Trade openness can result in higher growth and lower income gap, reflecting its role in the sustainable development in Malaysia (Ridzuan, Ismail and Hamat, 2018), yet, it may lead to depreciation of Ringgit (Lee and Law, 2013). Theoretically, trade openness benefits a country with balanced trade through resource allocation (DOSM, 2021a). Yet, it is not always the case; for the longer term, more trade openness, particularly, ongoing high reliance on (fish) imports, is likely to reduce the trade balance, implying that the fisheri industry confronts the eroding competitiveness globally although its market is open competitively (Soh, Lim and Chua, 2022a). This scenario indicates that trade openness may exert asymmetric effects (i.e., the different effect of the stage increases the trade openness and the stage reduction of the trade openness to trade balance), which can be captured by nonlinear methods, namely, Nonlinear Autoregressive Distributed Lag (NARDL) that allows for asymmetry with respect to positive and negative changes in the independent variable(s) (Bahmani-Oskooee and Kanitpong, 2017). This is particularly relevant to Malaysia that has high trade openness to import from other countries, further expand its market size (Ghani, 2009) and meet local demand for fish (Noh, 2018; Wong, 2021), lastly experiences trade deficit.

Malaysian import dependence and the trade-oriented economic system makes it more vulnerable to market sensitivity (Mat and Othman, 2014). As stated in Bank Negara Malaysia's 2019: Food imports and the exchange rate, more than meets the eye (Nordin *et al.*, 2019), around a quarter of the total Malaysian food supply is imported. Added by the source, the effect of exchange rate varies across commodities, where a depreciation is highly correlated with higher inflation rates for the imported food items such as fish (i.e., Indian mackerel). If the reliance on food (fish) imports persists, Malaysia is likely to experience a further depreciation of local currency and food (fish) become more expensive (Chan, 2017), lastly making fish trade deficit more daunting owe to high consumer preference on imported fish (Chan, 2017; Tay, 2018; Soh and Lim, 2020 ; MAFI, 2021a; Malay Mail, 2022).

Coronavirus disease 2019 (COVID-19) pandemic crisis, which has been an international health crisis followed by an ongoing economic crisis, causes the cancellation of key seafood trade events across the world and a delay in aquaculture harvests (GLOBEFISH, 2020). As proof, countries began prohibiting exports that were in high demand, namely medical and food products, to ensure ample domestic supplies as part of World Trade Organization, hereafter WTO (2020). Also, there was a huge decline in Malaysian fish exports to Singapore (The Star, 2020). Since fishery industry is relatively labour-intensive, the labour shortage issue (e.g., employees are ill or local and migrant labours are unable to travel) that was led by the coronavirus-related restrictions on movement has hurt fish production in Malaysia (Cullen, 2020; DOSM, 2021b). It has also indirectly changed food consumption pattern in Malaysia when consumer more preferred packaged and frozen products than fresh seafood given their non-perishable nature (FAO, 2020a; GLOBEFISH, 2020). Finally, it hurts the

livelihoods of fishermen and fish farmers as well as those countries that are highly dependent on fish such as Malaysia (FAO, 2020a; Wong, 2021).

Interestingly, fish trade deficit may be an aftermath of Malaysian dependency on trade with ASEAN competitors such as Vietnam, Indonesia, Thailand, Singapore and Brunei since they have been also dominant fish exporters (Ghani, 2009; ITC, 2021a; Soh, Lim and Chua, 2022b). Based on ITC (2021a), Singapore has been the Malaysian neighbouring largest fish export destinations within ASEAN, followed by Thailand, Vietnam, Indonesia and Brunei, in which these dominant markets import worth USD 185.06 million, accounting for around 27% of total Malaysian fish exports in 2021. It also implies that Malaysia continues to export fish to and import from these ASEAN countries in building resilience against current global uncertainties (ASEAN, 2020). For instance, in 2020-2021, Malaysia became the most dominant fish exporter for Singapore and Brunei while exports to Singapore, Brunei and Thailand rose 20.4% 59.0% and 11.3%, year-on-year, respectively (ITC, 2021a). Unlike export advantage and trade competitiveness, a Constant Market Share (CMS) generally decomposes the growth in the country's exports into components of different effects as underlying sources of trade performance, in which the modified CMS called Constant Market Share Competitiveness (CMSC) index that is backed by Constant Market Share Space (CMSS) framework, precisely tell the unrealized export potential of Malaysian fishery industry regarding export destinations and/or product categories given its success in addressing the inconsistency problem commonly found in traditional ones.

At this end, this study centres on several export advantage and trade competitiveness measurements, which are likely to yield the robust results, their factors affecting (with particular interest in the asymmetric effects of trade openness

and the role of a new factor) and CMS in Malaysian fishery industry. Theoretically, a country that has an export advantage is likely to be competitive in the international trade and vice versa. Lacking export advantage may discourage fish exports and cause the ongoing reliance on food (fish) imports, then poses a heightened risk the fish trade competitiveness. The importance of fishery industry in the context of export advantage, trade competitiveness and CMS cannot be understated. Recent analysis has found that multilateral reforms that reduce distortions, which relate to trade barriers and to those that distort domestic support, in world fishery markets, including Malaysia, can enhance its agricultural trade, incomes and overall welfare based on Organization for Economic Co-operation and Development, hereafter OECD (2017).

1.2 Problem Statement

Malaysia, which is a small open economy surrounded by ocean, has confronted an increasingly greater fish trade deficit, reflecting an absence of export advantage and trade competitiveness in the industry, despite the country's vast fishery resources and latent potential in the agrofood industry. As mentioned earlier, this issue is getting critical may be due to a decrement in global demand on fish trade and production (e.g., following the global financial and health crises), coupled with the increasingly greater dependence on fish imports (e.g, through a further depreciation of Ringgit), in Malaysia. This issue has drawn greater attention of policymakers as it poses threats to the Malaysian economic stability, food security and trade performance.

In fact, only few existing empirical studies have focused on trade performance of Malaysian fishery industry and concluded that Malaysia lost export advantage (i.e., in terms of RCA) and trade competitiveness (i.e., in terms of RTA) in a particular fishery product. In other words, trade performance in terms of export advantage and

trade competitiveness, which considers the entire fisheries aggregate, and their factors affecting, in conjunction with export competitiveness in terms of CMS have not been thoroughly evaluated in Malaysia. Particularly, the export advantage and trade competitiveness outcomes may be inaccurate and/or misleading due to the assessment of an index only, in which the additional measurements are used to increase the consistency and robustness of results. The afore-mentioned fisheries policies are generally driven by a mere consideration on the level of fish trade, often ignoring some underlying factors. To the best of our knowledge, studies on factors affecting the export advantage and trade competitiveness are still inconclusive without examining the short- and long- run as well as asymmetric effects of macroeconomic variables, in which their effects may differ in the short- and long-runs. Most interestingly, trade openness may asymmetrically affect export advantage and/or trade competitiveness while the effect of fishery employment has not been investigated although fishery industry is relatively labour-intensive. Addedly, the potential markets and product categories of Malaysian fishery industry are also still ambiguous since the existing studies focused on foreign countries, used Malaysia as their export destination and applied traditional CMS that has the inconsistency problem and may give misleading results. These are particularly important for Malaysian fishery industry since Malaysia itself is a fisheries nation, coupled with the fact that the industry, which has been amongst the most globally traded food products, forms the basis of the Malaysian economy but has yet to evaluate the trade performance of Malaysia fishery industry.

To this end, this study attempts to provide relatively stronger empirical evidence on export advantage, trade competitiveness as well as potential markets and product categories of the Malaysian fishery industry, in conjunction with its several important issues, like the importance of fish consumption and production in affecting

the export advantage; as well as trade openness (i.e., the economy's dependence on the international demand), fishery employment and foreign income that affect the fish trade competitiveness. Malaysia generally has high fish trade with other countries to fulfil the local and world demand for fish due to lower fish production. Yet, Malaysian fish imports exceed exports, and is now facing serious fish trade deficit due to lacking export advantage and deteriorating trade competitiveness are of concern.

1.3 Research Questions

This study seeks to answer the following questions:

(i) To what extent is Malaysian fish export advantage in the international market?

(ii) What are the factors influencing Malaysian fish export advantage?

(iii) How competitive is Malaysian fish trade in the global market?

(iv) What are the important factors that affect the Malaysian fish trade competitiveness?

(v) How competitive are Malaysian fish exports in its neighbouring markets?

Answer to these questions is especially relevant to the Malaysian policy makers, traders and marketers in terms of the development of long-term strategic plans regarding fishery industry. Policy makers are always interested in studying the effect of consumption, production, trade openness, exchange rate, employment and income on the trade performance when designing and improving proper trade policies regarding the industry to benefit fishermen, especially in rural communities. It also helps traders and marketers in decision making regarding the potential markets and product categories for enhancing the competitive status of Malaysian fishery industry.

1.4 Research Objectives

The general objective of this study is to evaluate the trade performance of fishery industry in Malaysia. This study seeks to attain the following specific objectives:

(i) To measure Malaysian fish export advantage (Revealed Comparative Advantage, Revealed Symmetric Comparative Advantage, Normalized Revealed Comparative Advantage and Comparative Export Performance).

(ii) To examine the factors influencing Malaysian fish export advantage.

(iii) To measure Malaysian fish trade competitiveness (Relative Trade Advantage, Revealed Competitiveness, Trade Competitiveness, Export-Import Ratio and Trade Coverage).

(iv) To investigate the factors affecting Malaysian fish trade competitiveness.

(v) To measure the export competitiveness (Constant Market Share Competitiveness and Constant Market Share Space) of Malaysian fish product categories to the prime neighbouring destinations (i.e., Singapore, Thailand, Vietnam, Indonesia and Brunei).

1.5 Scope of the Study

This study focuses on the fishery industry, which consists of marine capture (i.e., inshore and deep-sea) fisheries, aquaculture (i.e., marine, freshwater and brackish water and includes seaweed production) and inland fisheries (DOFM, 2017), in Malaysia only. Species groups generally covers crustaceans, demersal marine fish, freshwater and diadromous fish, marine fish not elsewhere included (NEC), molluscs (including cephalopods), pelagic marine fish, aquatic animals NEC and others (DOFM, 2017; FishStat, 2022). The first and third research objectives, RO1 and RO3,

measure fish export advantage and trade competitiveness, respectively, during 2016-2020. The study also applies econometric techniques on the time series data for the respective period of 2001-2020 (total 20 observations given the data availability of the variables) and 1976-2018 (total 43 observations) to achieve the second and fourth research objectives, RO2 and RO4, respectively. The fifth research objective (RO5) measures the competitiveness of Malaysian fish exports (product categories) in its top five neighbouring markets, which cover Singapore, Vietnam, Thailand, Indonesia and Brunei, for 2016-2020 where total eight categories are based on the four-digit level of Harmonized System (HS) code, that is HS 03 (Fish and crustaceans, molluscs and other aquatic invertebrates). The product categories are HS 0301 (Live fish), HS 0302 (Fish, fresh or chilled other than HS 0304), HS 0303 (Frozen fish other than HS 0304), HS 0304 (Fish fillets and other fish meat, whether or not minced, fresh, chilled or frozen), HS 0305 (Fish, fit for human consumption), HS 0306 (Crustaceans, fit for human consumption), HS 0307 (Molluscs, fit for human consumption) and HS 0308 (Aquatic invertebrates other than HS 0306 and HS 0307). Comparative advantage theory is the fundamental trade principle in this study. This is a comprehensive study of the fish trade as to give context to the industry development in Malaysia.

1.6 Significance of the Study

Although studies on export advantage, trade competitiveness and the role of trade openness have been widely reported in past literature, this research is distinctive from other trade studies since it focuses on Malaysian fishery industry, employs several measurements of trade performance (for the consistency purpose), emphasizes more on the short-run effect (i.e., changes in trade policies tend to have an immediate effect), as well as explores the nonlinear effect of trade openness and the role of new

factor- fishery employment. This would greatly improve the information base for policy makers, which is currently being driven by mere considerations on the level of fish trade, thereby often ignoring some underlying factors. Also, yield more comprehensive results of export advantage and trade position of the industry in the global market from the perspective of Malaysia. To the best of our knowledge, this is the first comprehensive study to evaluate the trade performance of Malaysian fishery industry given the measurements of and factors affecting both export advantage and trade competitiveness as well as a modified CMS. This study highlights the importance of the fishery industry, in which the fishermen remain the cornerstone. It would allow for better-targeted policies which are beneficial to Malaysian, especially rural communities connected with fishery industry by providing opportunities to fishermen to reach wider markets and obtain greater value for their produce.

Firstly, this study attempts to figure out the importance of Malaysian export advantage with the implementation of several proxies. The results reveal the level of export advantage of Malaysian fishery industry either it enjoys the vantage or in the opposite way. This is an important source for the local farmers in terms of export marketing to international markets, enhancing the development (i.e., production) of the fishery industry, broadening the fish exports and eventually the trade balance.

Then, this study also measures the trade competitiveness, which considers exports and imports, of Malaysian fishery industry to find out its actual trade performance. Similarly, the results show the level of trade competitiveness either it is highly competitive or in the opposite way. As compared to export advantage, trade performance is practiced by analysts to see what may be “revealed” about competitiveness regarding the industry.

To obtain a clearer picture of the export advantage and trade competitiveness, this study also examines the factors affecting. The outcomes not only convey which variables exhibit significant and pervasive effects on the export advantage and trade competitiveness, respectively, but also explore the nonlinear effect of trade openness and the role of new factor(s). Thus, the government could come up with new, improved and strategic plans, that engaging the private sector, for developing the fishery industry. Besides implementing policies aimed at rising export advantage, trade competitiveness and sustainable growth, imposing some restrictions (e.g., from the aspect of safety and quality) on fish imports could close the gap of the trade balance and ultimately improve the trade performance. Addedly, an optimal fishery (trade) policy for Malaysia requires more fishermen and culturists for a higher fish production and lower fish import dependence while enhancing their welfare, at the same time achieving a better fish trade performance.

Lastly, this study employs a modified CMS- CMSC and CMSS, which precisely tells whether the export competitiveness of the Malaysian fishery industry is driven by the Competitiveness Effect (CE) (i.e., the expansion in its own net market share) or other effect such as the Growth Effect (GE) (i.e., the growth in world or regional exports) by adapting the net relative change method. In other words, the CMSC and CMSS tell the unrealized export potential of the industry regarding the export destinations and/or product categories. Importantly, they have succeeded in solving the index number inconsistency problem carried by the traditional CMS, which has resulted from the arbitrary choice of an appropriate base year as well as a residual effect. A better understanding of the industry in terms of the (highest) potential markets and fishery product categories provides the necessary framework to enhance its export competitiveness in the regional (i.e., neighbouring) and global markets.

Accordingly, it is indeed important to evaluate trade performance of Malaysian fishery industry, focusing on the prospect of primary and/or agriculture sector, which covers fisheries, in facing the SDG 2030, SPV 2030, 12MP and IMP3 as well as that of fishery industry in NAP 2.0 for 2021-2030, DSMN for 2021-2025, Tuna Industry Development Strategic Plan for 2021-2030, NPOA-IUU, NPOA 2 and SPA Fisheries for 2021-2025. Certainly, this study would provide very useful input for the sustainability of Malaysian economy at the fishery industry, which would especially help in improving the welfare of the fishermen, fish farmers, culturists and fish processed company, as well as the securing the sustainability of fish resources. Specifically, the findings, which provide empirical evidence of the asymmetric effects of trade openness, the roles of new factors such as fishery employment and unrealized fish export potential regarding export markets, can greatly help policy recommendations (i.e., that can be applied by policymakers, traders, marketers and enterprises) in improving competitiveness and benefit.

1.7 Organization of the Study

This study consists of six chapters. This chapter provides a brief introduction to the Malaysian fishery industry and its current issues (i.e., lacking export advantage and trade competitiveness that is reflected by fish trade deficit), followed by problem statement, research questions, objectives, scope and significance of this study. Chapter two describes the background of the Malaysian fishery industry, which includes main fisheries policies, the performance (i.e., production, consumption, exports, imports), trade regulations and the contribution of the fishery industry. Chapter three is the literature reviews. It discusses the theoretical framework, major findings of existing empirical studies, related past studies and literature gap. Next, in Chapter four, the

methods of collecting and analyzing the data will be explained. Chapter five analyzes the results and discusses the findings of the research. Finally, in Chapter six, the findings will be summarized, and the policy implication of the findings are formulated. In addition, this chapter will also discuss some suggestions for future research.

CHAPTER 2

AN OVERVIEW OF FISHERY INDUSTRY IN MALAYSIA

2.1 Introduction

Malaysia, which is located in the heart of Southern Asia, shares immediate borders with Singapore, Thailand and Indonesia as well as maritime borders with the Philippines and Vietnam. Referring to Chowdhury and Yahya (2012), Malaysian fisheries waters cover a long coastline, which is 4,809km in length and area, Exclusive Economic Zone waters in the Andaman Sea, the Straits of Malacca, the South China Sea and the Celebes Sea.

According to the same source, West Malaysia covers 2,031km coastline while East Malaysia contains 2,778km coastline. This coastal region has prospects for coastal fisheries and other development activities. There is a total of 72 fish landing spots all over Malaysia including 31 in East Malaysia and 41 in West Malaysia (Figure 2.1).

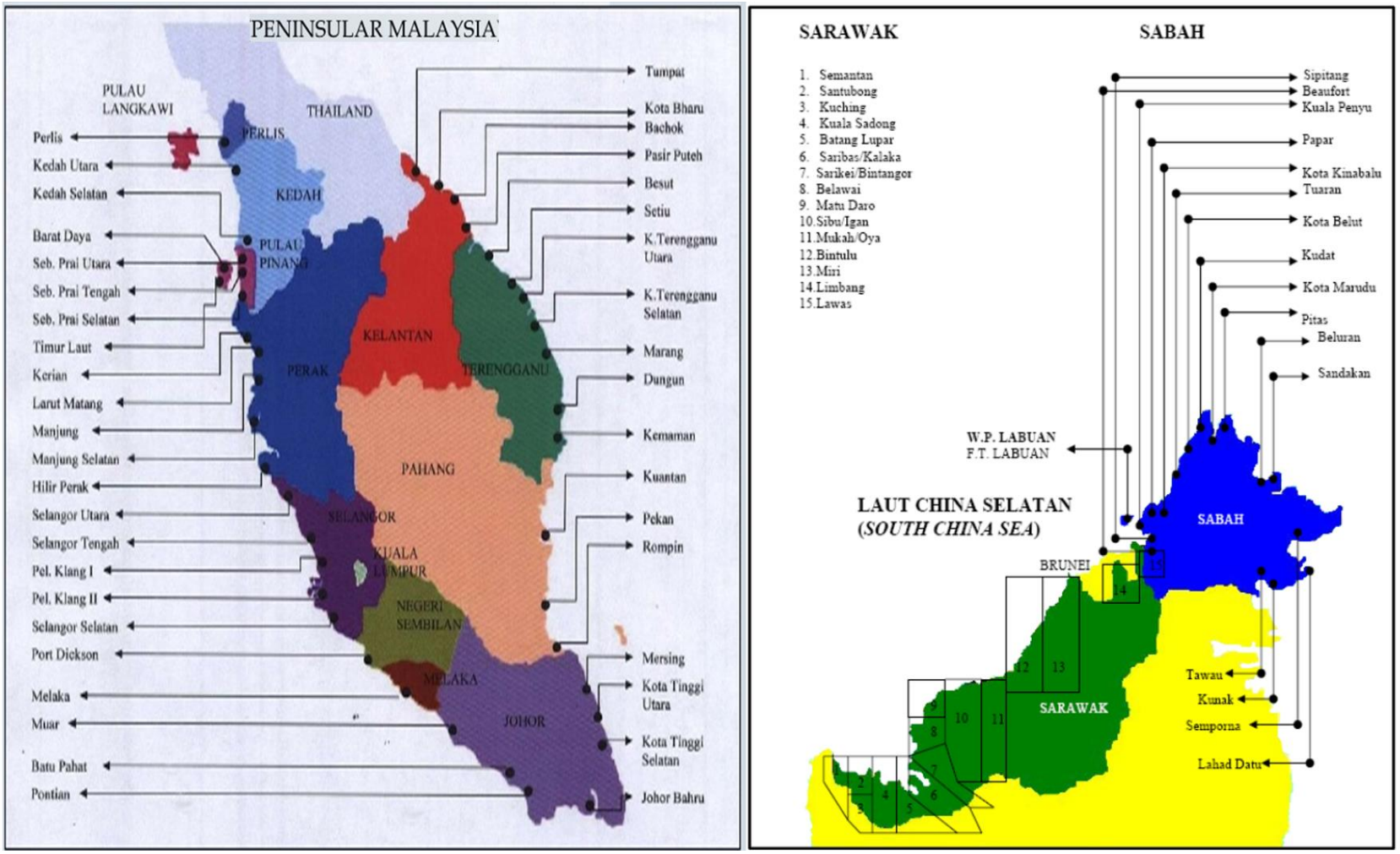


Figure 2.1 Marine and coastal fish landing spots in Malaysia
Source: Chowdhury and Yahya, 2012

2.2 Operational Definition

An operational definition ensures a description of concepts and/or terms applied to a specific situation for collecting meaningful and standardized data, which in turn strengthens the validity of a research. In this study, trade performance is characterized by the measurements of export advantage (RO1), trade competitiveness (RO3), and export competitiveness (RO5), in conjunction with factors affecting RO1 (RO2) and RO3 (RO4), which is mainly backed by comparative advantage theory. Although there is a spate of studies on international trade, the existing studies have provided only a simple definition of the related concepts and/or terms (Table 2.1). Focusing on RO1-RO5, the operational definition of different terms as follow:

Table 2.1 A summary of operational definition of different terms

Terms	Operational Definition
Comparative advantage theory	An economy's ability to produce a particular good or service at a lower opportunity cost than its trading partners
Competitiveness	The ability of countries, sectors and/or industries to sustain and improve their position towards competitors
Constant market share	Decompose the growth in the country's exports into components of different effects as underlying sources of trade performance
Exchange rate	The value of a country's currency versus that of another country
Exports	Goods and services that are produced in a country and sold to buyers abroad
Export advantage	The relative success or failure of the efforts of a country to sell more domestically produced goods and/or services in other countries by using export-only indices to understand the trade performance of the country
Export competitiveness	The ability of a country's "market development and possession" in foreign market(s) where its products are exported by assessing CMS to understand the trade performance of the country
Fish	Any aquatic animal or plant live, sedentary or not, and includes all species of finfish, crustacea, mollusc, aquatic mammals, or their eggs or spawn, fry, fingerling, spat or young, but does not include any species of otters, turtles or their eggs

Fish consumption	Average supply of fish and seafood across the population
Fish production	The volume of aquatic species caught by a country for all commercial, industrial, recreational and subsistence purposes as well as the harvest from mariculture, aquaculture and other kinds of fish farming
Fishery industry	Any activities with taking, culturing, processing, preserving, storing, transporting, marketing, or selling fish and fishery products either as a hobby or as an economic activity
Fishery employment	Number of people engaged in fishery industry, also refers to fishermen and culturist
Imports	Goods and services that are purchased from the rest of the world by a country's residents, rather than buying domestically
Linear Autoregressive Distributed Lag	Linear time series models in which both the dependent and independent variables are related not only contemporaneously, but across historical (lagged) value as well
Net market share	The difference between the market share at the beginning of the analyzing period and the market share at the end of the period
Nonlinear Autoregressive Distributed Lag	A single-equation error correction model that allows for asymmetry with respect to positive and negative changes in the independent variable(s).
Trade	A voluntary exchange between several parties to achieve certain goods, and generally represents the summation of exports and imports
Trade advantage	The difference between export advantage (i.e., RCA) and import advantage (i.e., Relative Import Advantage, henceforth RMA)
Trade balance	Net foreign demand for domestic goods, and always refers to the difference between exports and imports
Trade deficit	Negative trade balance when exports are less than imports
Trade competitiveness	The relative success or failure of the efforts of a country to sell more domestically produced goods and/or services in other nations than its purchase of foreign goods from other countries by using indices that consider both exports and imports to understand the trade performance of the country
Trade openness	The summation of exports and imports of goods and services measured as a percentage of GDP
Trade performance	A method of evaluating how a country is doing with its traders
Trade surplus	Positive trade balance when exports exceed imports

Notes: Trade advantage and trade balance are amongst the measurements of trade competitiveness while net market share is a core element of export competitiveness.

2.3 Main Fisheries Policies in Malaysia

The food and agriculture sectors are key to achieving SDG (FAO, 2022), which covers 17 goals with 169 targets (Figure 2.2). Namely, Zero Hunger (SDG 2), Decent Work and Economic Growth (SDG 8), Industry, Innovation and Infrastructure (SDG 9), Responsible Consumption and Production (SDG 12) and Life Below Water (SDG 14) that has been highly related to the fishery industry (Yarkina and Logunova, 2021; Global Seafood Alliance, 2022). In the 12MP, trade expansion and reforming agriculture sector are some major components of economic empowerment dimension in the shared prosperity initiative (Ministry of Economic Affairs, 2020). As part of the research of MIDF (2022), rising the domestic supply of food products would ameliorate the country's food trade deficit, dampen food inflation and create a higher value-added industry to the overall economy. It also added that efforts to bolster the production of agriculture sector will further foster the country's food security and the aspirations of the SPV 2030.

Figure 2.2 Sustainable Development Goals (SDG) 2030
Source: UN Development Programme, 2022

Moreover, consistent with the framework of 12MP, SPV 2030 and IMP3, fishery industry is getting more significant under agriculture given its contribution. (Please note that the contribution of the fishery industry will be shown in the sub-section 2.6). Malaysian fishery industry is managed based on the Fisheries Act of 1985 (No. 317); fisheries policies have been developed through research and cooperation with regional and international related bodies, in order to improve sustainability, productivity, competitiveness, trade, food security, fishermen's income and decrease reliance on imports of the industry in Malaysia. The main policies as below:

2.3.1 National Agrofood Policy 2.0 (NAP 2.0) 2021-2030

Aligned with SDG 2030 and the Fourth Industrial Revolution that involves the development of high-potential (agriculture) sectors, this policy is a continuation of the objectives of the National Agrofood Policy 1.0 (2011-2020), which is to ensure a rise in the competitiveness and export of the agrofood (e.g., fisheries) industry as well as aims to guarantee food security and a rise in the contributions to the income of the target groups and national economy. Pursuant to MAFI (2021a), the initiative of NAP 2.0 is as part of the 12MP's strategic framework that aims to accelerate the modernization of the agriculture sector while strengthening national food security, in which fisheries and aquaculture have been one out of four priority industries in this policy. This policy is developed looking into three key policy principles- the economic, social and environment aspects of the agrofood sector where their key indicators respective cover export value of agrofood, income levels of agrofood and sustainable fish stock.

NAP 2.0 encompasses five strategic thrusts (MAFI, 2021a). First, embrace modernization and smart agriculture; creating conducive ecosystem for the fields of