OCEAN POLICY RESEARCH INSTITUTE
SASAKAWA PEACE FOUNDATION

「海の論考」 OPRI Perspectives

OPRI Perspectives No.22 [2021]

The Opportunity and Challenges of the Northern Sea Route (NSR) after the Suez Obstruction of 2021

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1. Introduction

1-1. 2021 Suez Canal Obstruction

The shocking news made headlines worldwide from March 23 to April 3, 2021; the 400m, 200,000-tonne giant container, the ***Ever Given***, obstructed the Suez Canal at 6km north from its southern entrance. The illustration of a perspective drawing in Figure 1 shows the circumstance of the Ever Given obstruction. It was in a single-lane section of the canal of about 300m width. The vessel is owned by the Japanese shipping firm - SHOEI KISEN KAISHA, Ltd., a subsidiary of Imabari Shipbuilding Co., Ltd. As of July 2021, Ever Given remained 'stranded' in the Bitter Lake of Suez waters amid a legal fracas, while the cause of the accident is still under investigation. The Suez Canal Authorities demanded over **$500 million** in compensation for the losses resulting from the blockage [1], which will probably entail a long process of litigation and negotiations among the stakeholders of the shipping firms and reinsurance companies.[2]

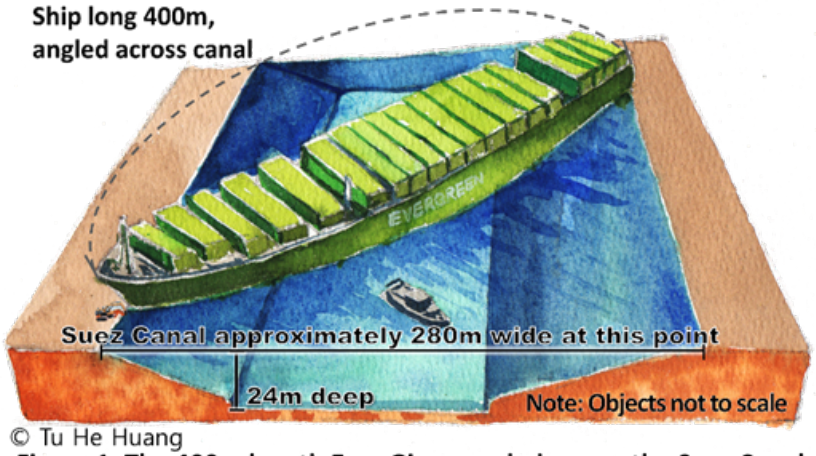


Figure 1. The 400m length Ever Given angled across the Suez Canal

The Suez Canal blockage affects not only the global shipping industry but also retailers, supermarkets, and manufacturers. Based on Lloyd's List, Allianz, and Braemar ACM data, the stranded ship was holding up an estimated $9.6 billion of trade along the waterway each day. Furthermore, the blockage could have a global cost of $6-10 billion due to a 0.2-4% reduction of annual trade growth with the additional cargo shipping cost between Asia and the Middle East jumped 47% to $2.2 million[3]. According to the Suez Canal Authority, 12% of global trade

[1] BBC https://www.bbc.com/news/world-middle-east-57719551 (Accessed 7 Jul 2021)
[2] Business Insider https://www.businessinsider.com/ever-given-egypt-cuts-down-its-compensation-claim-300-million-2021-5 (Access 26 May 2021)
[3] BBC https://www.bbc.com/news/business-56559073 (Accessed 21 May 2021)

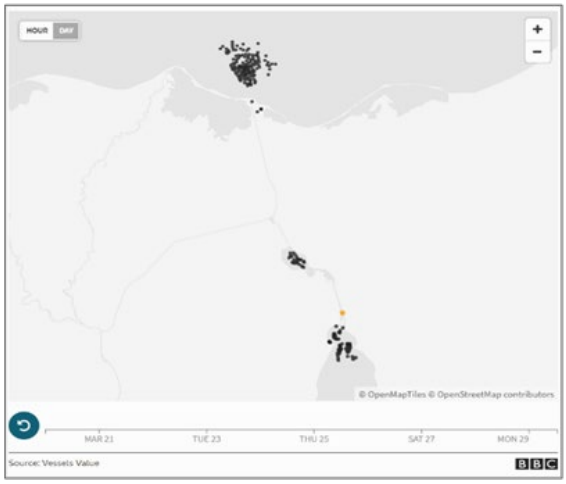


Figure 2. Ship movements in Suez Canal 20-29 March

passes through the 193km canal, which connects the Mediterranean Sea to the Red Sea and provides the shortest sea link between Asia and Europe. During the 6-day blockage, a total of 369 ships were reported stuck in a tailback waiting to pass through the canal (Figure 2)[4].

1-2. Growing Asia-Europe Cargo

Since 2017, the number of vessels, cargo, and net tonnage going through the Suez Canal has been on an upward trend and marked its highest level in 2020 despite the COVID-19 global pandemic. In the breakdown of the cargo type, the primary goods for shipping are container cargo and energy products, followed by food, metals, and chemical products.[5] Regarding the export origin, there are no dominating regions from Europe in the North to South route; while in the Asian region, 93% of the cargo tonnage in the South to North Route was accounted for by the South East Asia, Arabian Gulf, Red Sea and South Asia regions.

The 6-day obstruction by the Ever Given gave the world a sharp lesson on global supply chain disruption, putting the Suez Canal Authorities under pressure to upgrade the waterway's technical infrastructure to avoid further disruption in the future. Meanwhile, an alternative route of the Cape of Good Hope in Africa to the Far East, can take two weeks longer. According to an investigation by Bloomberg, containers falling overboard rose to a 7-year high in 2020, resulting in more than $160 million lost.[6] The obstruction risk in the Suez Canal and overloading global logistics have alerted shipping companies about capacities and the navigational distances for the alternatives. From the perspective of risk diversification, expanding the use of the Northern Sea Route (NSR) via the Arctic Ocean has come up as an option for realization.

[4] BBC https://flo.uri.sh/visualisation/5670520/embed?auto=1 (Accessed 21 May 2021)
[5] The Suez Canal Authority Navigation Statistics https://www.suezcanal.gov.eg/English/Navigation/Pages/NavigationStatistics.aspx (Accessed 21 May 2021)
[6] Bloomberg (2021) "Shipping Containers Fall Overboard at Fastest Rate in Seven Years" https://www.bloomberg.com/news/articles/2021-04-26/shipping-containers-plunge-overboard-as-supply-race-raises-risks (Accessed 21 May 2021)

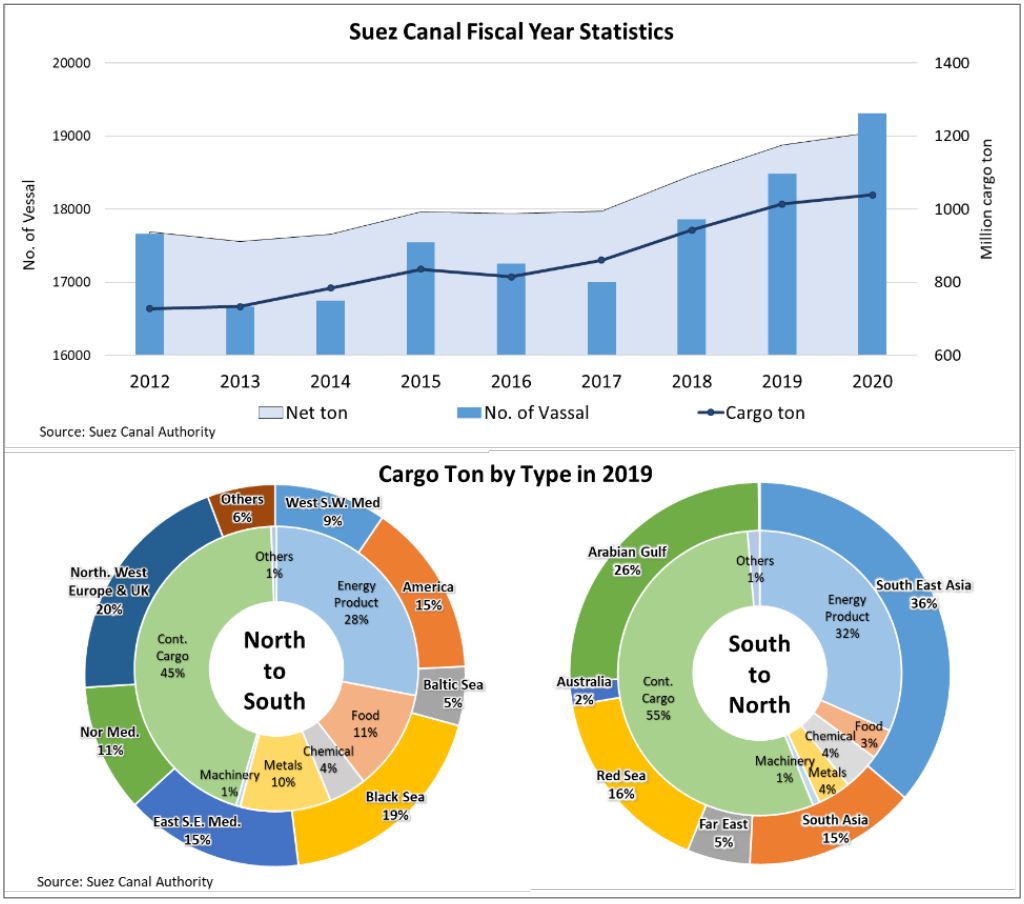


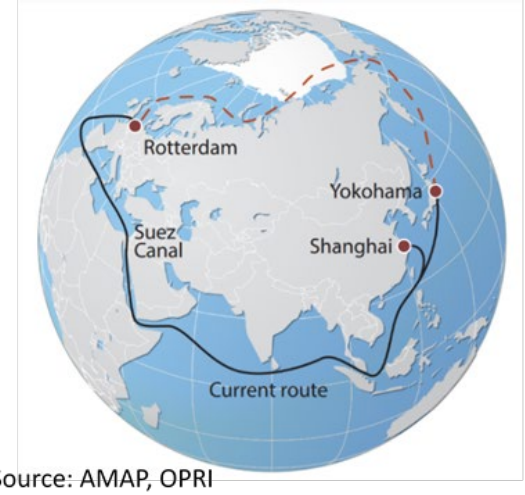
Figure 3. The Statistics of Cargo in Suez Canal

2. The Northern Sea Route (NSR)

2-1. NSR Usage

Comparing with the cargo shipping route from the Far East to Europe via the Suez Canal, the accessibility of Northern Sea Route (NSR) could provide an indisputable advantage in the traveling distance. By using the NSR, the navigational distance between Rotterdam and Yokohama, for instance, is only 11,100km (6,900 miles), while via the conventional southern route, which is 18,400km (11,430 miles), passing through the Suez Canal.[7] The potential of the NSR could not only reveal in the reduction of navigation distance by as much as 40% but also provide an appropriate development opportunity for the abundant natural resource of mining in the Siberian and Russian Far East regions.[8] With these motivations, the NSR accessibility presents the commercial potential to facilitate international shipping and the world market.

[7] Arctic Monitoring and Assessment Programme (AMAP) (2012) Arctic Climate Issues 2011: Changes in Arctic Snow, Water, Ice and Permafrost. *SWIPA 2011 Overview Report*.
[8] Kitagawa, H. (ed) (2006) *New Era in Far East Russia & Asia*. Ocean Policy Research Foundation.



Source: AMAP, OPRI

Figure 4. The Northern Sea Route (dash line) and the Suez route (left) / Navigation in the Arctic Ocean (right)

There is no general agreement on the exact limit of the Arctic Ocean, and Canada and the Russian Federation claim part of these waters as internal, based on historic title and the drawing of straight baselines[9]. However, the NSR is the shortest route linking Europe to Asia. Until the 20th century, due to its harsh icebound environment, oceanographic ships conducting surveys were the primary users, but the ice-free period in summer has become longer every year, making it the better condition for sailing[10].

To demonstrate NSR as an alternative route for the international shipping market with the potential of saving thirteen days between Hamburg and Yokohama, the Soviet freighter started a voyage from Hamburg to Yokohama, passing through Havre, Antwerp, and Rotterdam early in 1967. This demonstration coincided nicely with the Soviet viewpoint; however, no foreign shipper accepted the Soviet offer in 1967, even during the closure of the Suez Canal during the Six-Day War in 1967, which caused delays and extra expenses, offsetting the expected time advantage[11].

2-2. Growing cargo shipping in NSR

In recent years, the NSR has begun to attract global attention while its importance as a corridor of global importance for the transport of national and international cargo will increase due to climate change. Commodity prices, ice-resistant ships, Russian regulations, and the need to modernize maritime infrastructure are among the influences on NSR usage. Economic aspects influence stakeholders' choice of routes. According to Nord University, most of the ships passed through the NSR waters without difficulty. The volume of cargo transport in the

[9] Boone, L. (2013) "International Regulation of Polar Shipping," in E. Molenaar, A. Elferink, D. Rothwell (eds), *The Law of the Sea and the Polar Regions*, Leiden: Martinus Nijhoff, 193-215.
[10] The Japan Association of Marine Safety (2016) *Northern Sea Route Handbook*
[11] Polar Record, XTV (1968) 332.

water area of the NSR increased from 4 to 31.5 million tons between 2014 and 2019. The number of transit voyages and cargo volumes via NSR grew slowly, but a significant increase was seen in 2020 (Figure 5). During this incomplete four-month period, the total amount of cargo flow for 64 voyages reached 1.28 million tons. The major share of the cargo transported was iron ore concentrates of 1 million tons.[12]

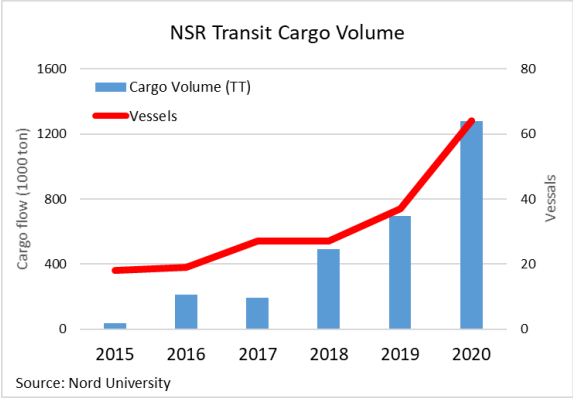


Figure 5. NSR Shipping Traffic and Transit

If freight and bunker prices are low, the economic advantage of using the NSR versus using the southern route is quickly lost, as was the case in 2014. If the difference in commodity prices between the European and Asian markets equalizes, the rationale for sending goods through the Arctic is limited. Conversely, consistently high commodity prices would be a driving force for international transit transportation in the NSR.[13] The number of usages of the NSR is booming in 2021. The LNG Tanker, Christophe de Margerie, started her travel on January 5, 2021, from the port of Sabetta, Russia, arriving in Jiangsu, China on January 27, with 11 days of icebreaker assistance. This shows that navigation in the NSR is likely feasible all year round, increasing interest among more countries in using NSR as an alternative sea route.

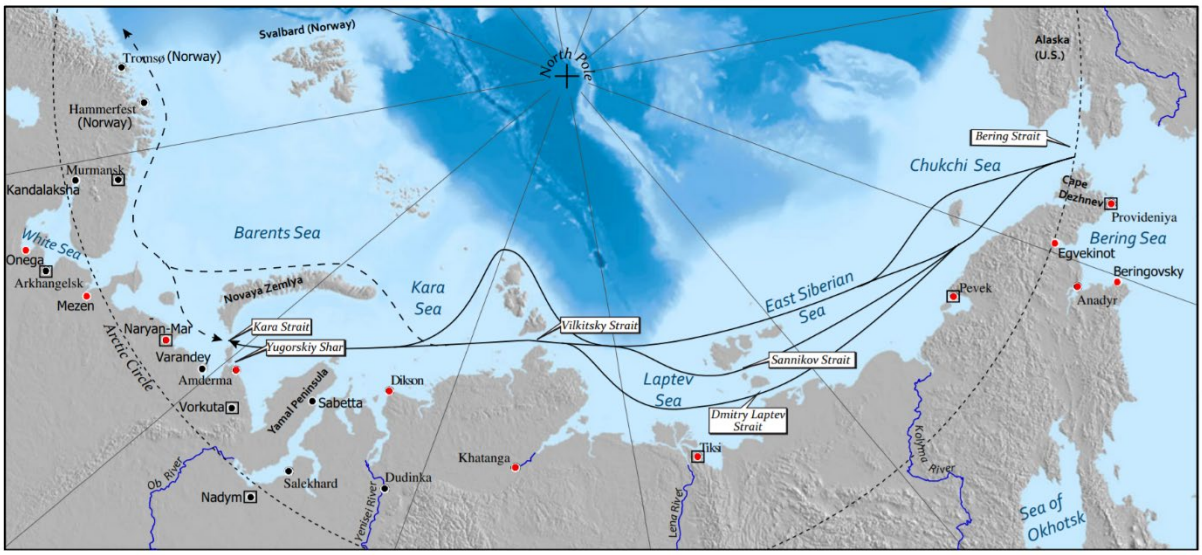


Figure 6. Map of the Russian and Norwegian Arctic coasts with the NSR (solid line)[14]

[12] Nord University https://arctic-lio.com/nsr-shipping-traffic-transit-voyages-in-2020/ (Accessed 23 May 2021)
[13] Gunnarsson, B., Moe, A. (2021) "Ten Years of International Shipping on the Northern Sea Route: Trends and Challenges", *Arctic Review on Law and Politics 12*: 4-30.
[14] Farré, A., Stephenson, S., Chen, L. et al (2014) "Commercial Arctic shipping through the Northeast Passage: Routes, Resources, Governance, Technology, and Infrastructure", *Polar Geography 37*(4): 298-324.

However, booming NSR use might cause severe problems in the future, such as oil spills or shipwrecks or running aground as happened in the Suez Canal. Compared to other sea routes, the NSR is still under development, while equipment and facilities investment along the coast necessary for responding to search, rescue, and oil spills are still inadequate, since the Northern Sea is very vulnerable compared to the Southern oceans, with a fragile environment, especially in wintertime.[15] Active capital investment and legislation are crucial challenges in implementing usage of the NSR. Nevertheless, shipping costs for the NSR are still unable to compete with Suez Canal usage and with the current super large container ships in use.

3. A Comprehensive Economic Assessment of NSR

Since the 1990s, trade liberalization in the mushroomed regional economic partnership agreements (EPAs) have substantially accelerated greater trade volume, and cases could be referred to the European Union (EU), Association of Southeast Asian Nations (ASEAN), and North American Free Trade Agreement (NAFTA[16]). More importantly, the newly concluded inter-regional EPAs such as the Trans-Pacific Partnership (TPP), Regional Comprehensive Economic Partnership Agreement (RCEP), and EU EPAs with Japan and other Asian countries are expected to create greater integration on trade. Meanwhile, climate change has made the Arctic routes an option during summer,[17] a trend which could benefit Japan and other East Asian countries. Analysis on the growth potential of trade volume would be desirable to further interpret the transition of the global supply chain under the inter- and intra-regional economic integration.

3-1. Methodology

To capture the economic insights, a numerical model which is widely used for global economic analysis and trade issues – GTAP model[18] is applied to review the possible

[15] "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic" was adopted in 2011 by the Arctic States as the first legally binding instrument negotiated under its auspices of the AC to strengthen aeronautical and maritime search and rescue cooperation and coordination in the Arctic. Also, there are the Arctic Coast Guard Forum (ACGF) to foster safe, secure, and environmentally responsible maritime activity in the Arctic. Economic development, in the forms of resource extraction, adventure tourism, and trans-Arctic shipping, along with traditional subsistence activities, drives much of the current maritime activity in the region. This increased activity requires an extended Coast Guard presence in the Arctic operating area. The Coast Guard is now involved actively with the International Civil Aviation Organization (ICAO) concerning the sustained growth in cross-polar flights of passenger and cargo aircraft. The Coast Guard has been a key contributor to the development and implementation of ICAO's Global Aeronautical Distress and Safety System (GADSS) (The Arctic Coast Guard Forum HP at <https://www.arcticcoastguardforum.com/about-acgf>, and United States, Fiscal Year 2017 Report to Congress, "Arctic Search and Rescue" at <https://www.dhs.gov/sites/default/files/publications/USCG%20-%20Arctic%20Search%20and%20Rescue_1.pdf>).

[16] On July 1, 2020, Canada-United States-Mexico Agreement (CUSMA) entered into force.

[17] Countryman, A., Francois, J., & Rojas-Romagosa, H. (2016) "Melting ice caps: implications for Asian trade with North America and Europe", *International Journal of Trade and Global Markets* 9(4):325-369.

[18] Hertel, T. (ed.) (1997). *Global Trade Analysis Project: Modeling and Applications*. Cambridge University Press.

consequences of the NSR.[19] The Arctic routes have been tested through different scenarios and the simulation results showed that trade volume between Asia, Europe, and North America will be boosted, while the trade flow of specific sectors were not interpreted.[20] We aggregated 7 regions (Japan, East Asia, ASEAN, South Asia, Europe, North America, and the Rest of the World) and 12 sectors for a scenario consisting of (1) Accessibility of NSR;[21] (2) EPAs enactment between Japan, Europe, East Asia, and ASEAN; and (3) Technology improvement. The technology improvement was presented as production efficiency improvement, while these parameters are calibrated from Japan's SciREX Policy Intelligence Assistance System Economic Simulator (SPIAS-e).[22] The simulation results could provide key economic indicators with policy implications.

3-2. Output Change and Welfare analysis

The simulation results in Figure 7 showed that the improvement in GDP and welfare might refer to trade liberalization and technology improvement under the comprehensive scenario of NSR. The welfare is expressed in equivalent variation (EV), comparing the utility of consumption from the baseline. East Asia and ASEAN were slightly better off, but other regions such as North America and South Asia could worsen with less NSR and EPA connectivity.

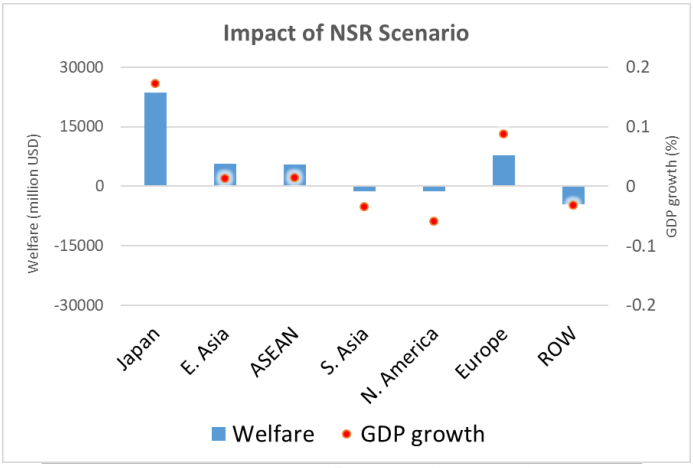


Figure 7. GDP and Welfare analysis under NSR

3-3. Breakdown of trading partners

To better interpret the transition of trading partners, the sectoral import breakdown could be informative with trade flow and the implications of production network formation, which could enable stakeholders to acquire an overview of potential under the comprehensive scenario of NSR and its spillover impact. Figure 8 demonstrated the import change of manufacturing sectors from countries of origins.

[19] Nuno-Ledesma, J., & Villoria, N. (2019). "Estimating International Trade Margins Shares by Mode of Transport for the GTAP Data Base", *Journal of Global Economic Analysis*, 4(1), 28-49.
[20] Lasserre, F. (2014). "Case studies of Shipping along Arctic routes. Analysis and profitability perspectives for the container sector", *Transportation Research*, A(66):144-161.
[21] The assumptions of navigation cost reduction: Europe-Japan (15%); Europe-East Asia (10%); and Europe-ASEAN (5%).
[22] Kuroda et al. (2018). "Assessments of ICT Policy Options: The Framework of Input–Output Table Linked with Intangible Knowledge Stock". In: Mukhopadhyay K. (ed) *Applications of the Input-Output Framework*, pp. 65-110. Springer.

Figure 8. The breakdown of import change (%)

Agriculture: Japan substantially increased agriculture (corps and livestock) imports from Europe, East Asia and ASEAN regions, while only East Asia increased imports from Japan.

Energy: The productivity and efficiency improvement in Japan's energy sector could make it more energy independent and a technology exporter.

Food: The co-benefits of NSR and EPA could substantially stimulate imports (food product and beverage) between Japan and the European regions, as well as for East Asia and ASEAN.

Manufacture: Japan and ASEAN increased imports from East Asia. In contrast with other regions, East Asia increased imports from Japan, implying the transition of production networks.

Steel: Due to decreased productivity, imports for Japan increased significantly from other regions while ASEAN, South Asia, North America reduced imports from Japan.

Chemical & Pharmaceutical: Japan's competitive advantage made the East Asia, ASEAN, and Europe regions substantially increase their imports; imports from East Asia also increased significantly in ASEAN.

Electronic equipment: South Asia's role has gradually become important for all regions, while the dependence on Japan decreased substantially in all regions except for the East Asia and European regions.

Machinery: Except for the East Asia and European regions, all other regions decrease their imports from Japan, while Japan increased imports from all other regions, especially South Asia.

Transport equipment: Import demand from Japan remains extremely strong in the East Asia, ASEAN, and European regions, while more integration could be found in East Asia and ASEAN.

ASEAN and South Asia may have more important roles in electronic equipment and machinery sectors; technology advancement in Japan's energy sector could reduce energy dependence. For agriculture, food, and manufacture, inter-regional integration could be observed between Japan and Europe, while for the transport equipment sector, more consolidation could be observed in East Asia, ASEAN with Japan.

4. Challenges and Opportunity of NSR

4-1. Problems arising from growing NSR use

Since unique skills and expertise are required to sail in the Arctic Ocean, the Russian government introduces the permission system in the passage of NSR, and they sets a condition where shipping activities are permitted, based on sailing seasons or sea ice conditions.[23] Under certain conditions, escort by icebreakers operated by the Russian state company and/or introducing ice-class vessels is necessary to obtain permission. UNCLOS Article 234 (Ice-covered areas) indicates that "The coastal states have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction, and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance." Such laws and regulations shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence. Because of the sensitiveness and harsh environment in the arctic, such Russian regulation is a rational act and harmonizes with UNCLOS's article.

[23] Abe, M., Otsuka, N. (2019) "Northern Sea Route (NSR) as a Major Transport Route: Opportunities and Challenges", *Asian Transport Studies* 5(4): 617-634.

The main problem is the absence of an emergency evacuation system and the provision of medical assistance to crew members of sea-going ships in the water area of the Northern Sea Route. As of 2021, there are only three bases, Dikson, Pevek, and Tiksi, for search and rescue[24]; considering the harsh conditions in the Arctic Ocean, the search and rescue measures for the emergency are desirable but it remains doubtful if they could provide sufficient assistance in critical circumstances. On 26 October 2020, President Vladimir Putin of Russia formally adopted the new "Strategy for Developing the Russian Arctic Zone and Ensuring National Security through 2035",[25] and the new strategy also pointed out the delay in the development of the infrastructure of the NSR, the construction of icebreakers and rescue and auxiliary fleets in regard to the deadlines for the implementation of economic projects in the Arctic zone.

The limited number of ice-class vessels for business, especially in the winter season, is another critical issue. In recent years, the summer sailing period has been expanding due to the decrease in sea ice, which has made it easier to coordinate cargo demand with the operation schedule of ice-class cargo ships. However, the number of high ice-class cargo ships is limited for year-round operation, making it very difficult to coordinate schedules, and charter fees are high. Besides the challenges above, there are actual developments for practicalizing NSR. According to the new Russian strategy, the fulfillment of the main tasks in the field of social development of the NSR is ensured through the implementation of measures such as organization of medical support for navigation of ships, comprehensive development of the infrastructure of seaports and shipping routes, the creation of a headquarters for maritime operations in shipping management, construction of hub ports and creation of a Russian container operator in order to ensure international and coastal shipping, the creation and development of a satellite constellation based on domestic equipment in highly elliptical orbits[26].

Despite the well-planned strategy, the allocation of financial support has not yet been coordinated, making for uncertainty in realizing the project. Nevertheless, more dialogues among stakeholders of shipping, investigation, and energy firms have begun, perhaps leading to concrete action. It is believed that NSR usage actualization will be accelerated soon if these infrastructures are prepared.

[24] Abe, M., Otsuka, N. (2019) "Northern Sea Route (NSR) as a Major Transport Route: Opportunities and Challenges", *Asian Transport Studies* 5(4): 617-634.
[25] Based on the "Basic Principles" for Arctic policy adopted in March and succeeds the Arctic strategy 2020 dating from 2013
[26] Russian Federation (2020). "Strategy for Developing the Russian Arctic Zone and Ensuring National Security through 2035 (О Стратегии развития Арктической зоны Российской Федерации и обеспечения национальной безопасности на период до 2035 года）".

4-2. Opportunity for Japan in Shipping R&D

(a) Innovative financing solution for SO_x emission reduction

The International Maritime Organization (IMO) has been working to limit SO2 emissions because of their potential negative impact on the environment and human health. In 2020, the IMO introduced new regulations requiring ships to use cleaner fuels, intending to reduce annual SO2 emissions by more than 70%. Satellites can be used to verify that this is being complied with. The obstruction in the Suez Canal also generated another critical issue of sulphur oxide (SO_x) emissions, as the concentration of sulfur dioxide (SO_2) in the air on the Mediterranean side of the canal rose to five times the average level.[27] SO_2 is produced by the combustion of heavy oil used as fuel for ships. Once ***Ever Given*** went aground and was able to navigate the canal, SO_2 levels quickly decreased. The incidence also pointed out the importance of the "Roadmap to Zero Emissions from International Shipping," using technology to increase energy efficiency and reduce greenhouse gas emissions.

With such concerns over the negative environmental impact of SO_x emissions by shipping, it is worth recalling that in 2018 an innovative financing instrument was initiated by Nippon Yusen Kaisha (NYK Line) when it issued the world's first green bond by a shipping company. The ¥10 billion bonds have been used to achieve NYK's "Technology Roadmap for Eco-friendly Vessels," with R&D in LNG fuel shipping vessels for effective SO_x reduction in emissions and better equipment for SO_x scrubbers.[28] Given that maritime transport serves as the backbone of the global economy, accounting for more than 80% of global trade by volume, the reduction in emissions from ships could contribute to improving health and environment for the world, particularly for populations living in coastal and port areas. Financing instruments for R&D in the shipping industry for cleaner energy should be encouraged and linked with the green/blue investment market under the global trend of *"decarbonization"*.

(b) Emerging global supply chain of hydrogen power

For creating more resilient maritime transportation, hydrogen fuel for ships is now considered the next-generation fuel. Kawasaki Heavy Industries, Ltd. announced its obtainment of approval in principle for a cargo containment system (CCS) by offering the world's largest capacity (40,000 m^3 class per tank) liquefied hydrogen carrier with the following features: (1) Enabling transportation of cryogenic liquefied hydrogen in large amounts; (2) Utilizing an independent, self-supporting design with a structure capable of responding flexibly to the thermal contraction that occurs when loading cryogenic liquefied hydrogen; (3) Developing a high-performance heat insulation system that mitigates boil-off

[27] BBC https://www.bbc.com/news/science-environment-56735508 (Accessed on 24 May 2021)
[28] NYK https://www.nyk.com/english/esg/envi/greenbond/ (Accessed 24 May 2021)

gas (BOG) in response to heat ingress; and (4) Designing to utilize BOG as fuel to power the ship effectively, reducing SO_x/CO_2 emissions from liquefied hydrogen transport operations.[29]

The NSR also opens the possibilities for a hydrogen power supply chain by leveraging existing hydrogen transportation activities and local supply chain capabilities on the resource abundant areas. Increasing the level of activity is the key to growth, which will lower the cost of hydrogen and increase supply chain opportunities.[30] Progress in building hydrogen fuel power will not only contribute to high-efficient shipping, but also the emerging system for clean energy. The system and infrastructure still require substantial R&D input to generate economic scale of return.

5. Future prospects and concluding remarks

As Singapore has been the Asian hub for the Suez Canal, Japan has great potential to be the hub for the NSR, especially in Hokkaido. The Hokkaido Regional Development Bureau (RDB), together with the Japan Aerospace Exploration Agency (JAXA), the National Institute for Land and Infrastructure Management (NILIM), and Aomori Prefecture, is jointly investigating the possibility of utilizing satellite AIS data for the development of Arctic Ocean shipping routes. With the exceptional connectivity of global air transpiration, ports in Japan have great potential to be the NSR hub for the Asia Pacific region in shipping, scientific research, and Arctic tourism.

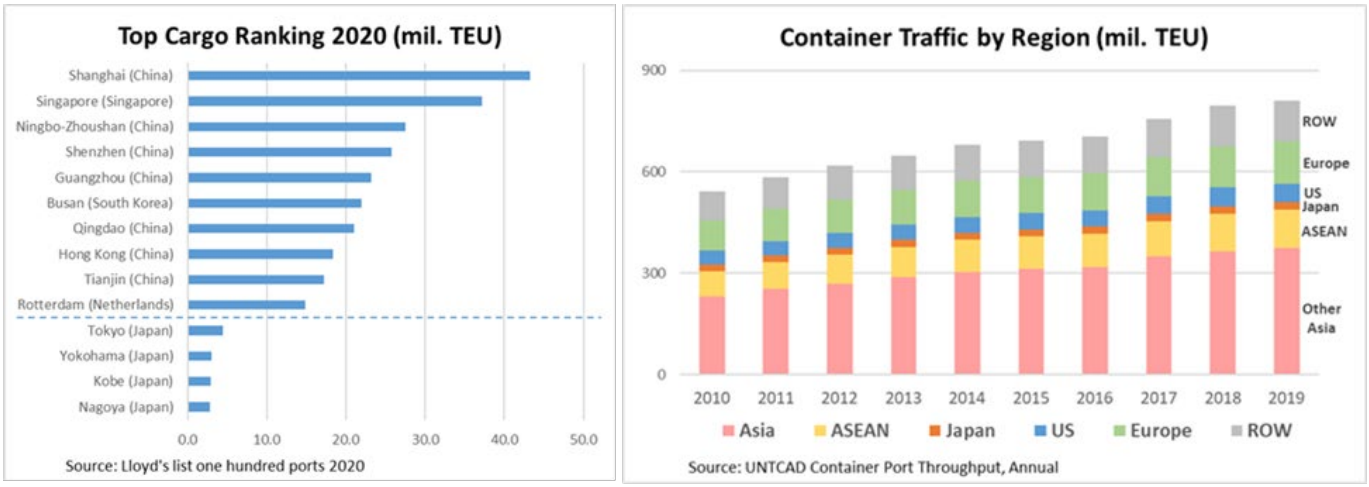


Figure 9. Cargo ranking and statistics

Statistics for global cargo traffic in Figure 9 showed that the Asia-Pacific had become the fastest growing region, implying a considerable environmental burden. Our comprehensive

[29] Kawasaki Heavy Industries, Ltd. https://global.kawasaki.com/en/corp/newsroom/news/detail/?f=20210506_9983 (Accessed 24 May 2021)
[30] METI (2019) https://www.meti.go.jp/english/press/2019/pdf/0312_002b.pdf (Accessed 24 May 2021)

economic assessment of the NSR also projected trade flows in goods at an inter- and intra-integration scale. Even if the NSR is not cost-competitive compared with the Suez Canal route regarding its freight fees, its time-effectiveness for high value-added goods is highly anticipated. As one of the suppliers for key components of automobiles, machinery, and electronic equipment, the clean transportation and the hydrogen society initiated by Japan could generate spillover effects on shipbuilding and infrastructure upgrades in the region, creating harmony between human activity and the ocean.

Figure 10. Port of Tokyo and its International Cruise Terminal

The 2021 Suez Canal obstruction provided valuable lessons for the global shipping industry regarding the logistics of cargo overloading and motivated firms and states to consider risk diversification. Although the NSR cannot currently compete with the current Suez Canal route in terms of transportation costs and stable demand in the shipping market, it should gain attention as an alternative to the Suez Canal for diversifying risk. More importantly, the economic assessment of the potential of the NSR will also encourage more discussion on R&D and international regulations to achieve energy efficiency and eco-friendly transportation. The emerging need for and merits of the Arctic route and its usage will attract potential funding and encourage stakeholders to reexamine regulations and increase interdependence on the sustainable development of the Arctic Ocean.