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Finnish tonnage as the implementer for security of seaborne supply in maritime transport

Some recommendations for the policy-makers

By Bo Österlund

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Bo Österlund, Commodore, one star admiral (resigned from permanent military service), Doctor of Military Sciences, honourably discharged in the summer of 2006 from his duties as the Commander of the Turku and Pori military command. Österlund has been closely following the changes in the security situation in the Baltic Sea region. His focus has been on the maritime transport in the region and in its analysis. The studies conducted on maritime transport has given birth to many written works on shipping, maritime transport, and ports. The report "Suomen meriliikenteen huoltovarmuusselvitys 2012" that was delivered to the National Emergency Supply Agency in the spring of 2014 was the genesis for the doctoral research beginning in early 2015. Österlund defended his thesis "Suomen meriliikenteen huoltovarmuudelle asetetut tavoitteet ja niiden toteutuminen" in the field of military economics on January 18, 2019 at the National Defence University. The report at hand is based on the doctoral research and relies on the recent development in maritime transport and shipping.

Contact: bo.osterlund@pp1.inet.fi

Summary

In the foreign trade in Finnish maritime transport, the tonnage sailing under the Finnish flag (SUFF) has been diminishing for a long time, and fallen under 50 % in the early 1980s already. Finland's dependence on the merchant marine sailing under a foreign flag to Finland has, in turn, grown gradually. In the statistical year 2016, the share of both Finnish-owned and foreign-owned tonnage SUFF in the international maritime transport has, on average, stabilised[1] at little over 30 % (in importing over 40% and in exporting over 20%).

Keywords

SUFF, sailing tonnage, capacity, transport performance, security of seaborne supply, authorities, business sector, voluntariness, control and management organisation, operational readiness and responsibility.

1 HE 30/2015 vp, appropriations 31, main category: Administrative branch of the Ministry of Transport and Communications, expense 31: "transport subsidies and outsourced services." In the government proposal (HE), the stabilisation of the tonnage share at 30 percent is stated as implemented, as a fact.

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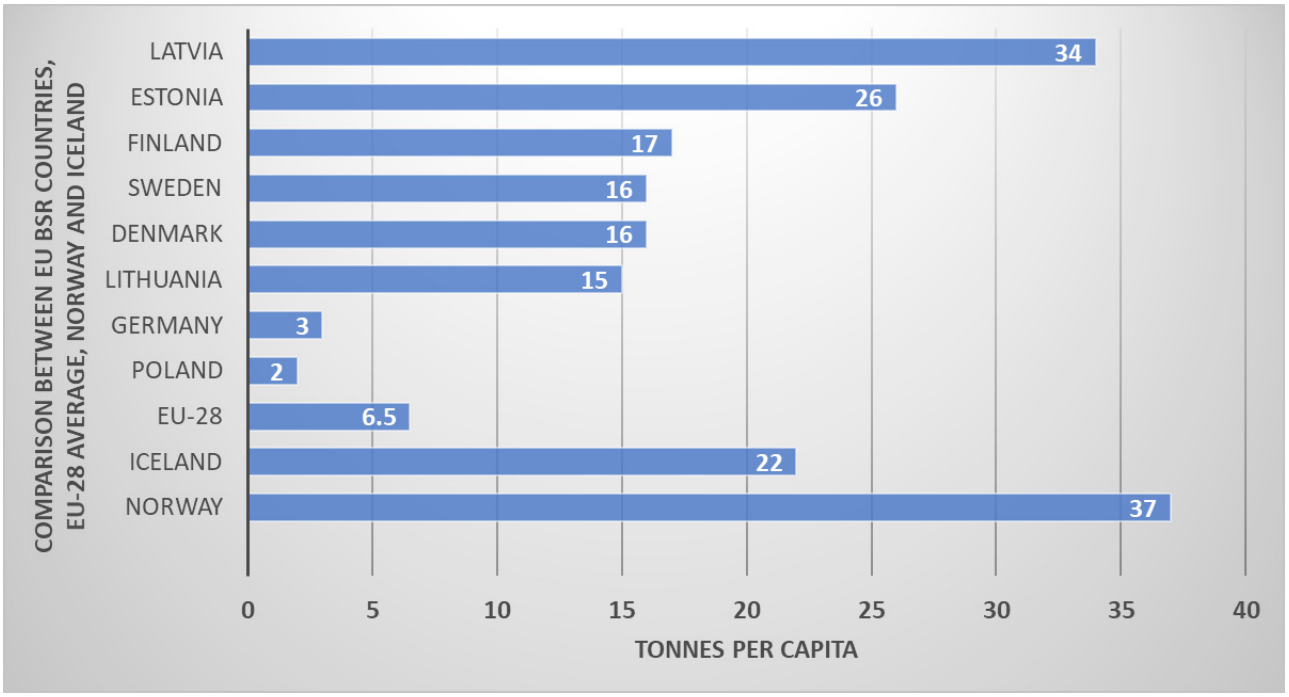
Abbreviations

dwt	Deadweight capacity of a vessel, deadweight tonnage.
NESA	National Emergency Supply Agency.
MTS	Maritime transport statistics, vessel type classification based on the classification used by Lloyds. From the start of 2015, the maritime transport statistics are created with the MTS application.
SUFF	Sailing under the Finnish flag (tonnage), which includes both Finnish-owned and foreign-owned merchant ships.
tnm	Ton nautical mile.
UNCTAD	United Nations Conference on Trade and Development. The trade, investment, and development section of the UN General Assembly.
VTS	Vessel Traffic Service

1. Dependence on shipping

Finland's heavy dependence on shipping can be considered as shipping dependence in two ways: As tons in transported goods per capita, or as import volume and share of all Finnish imports shipped by sea.

Figure 1. Comparison of dependency on maritime transport between EU countries in the Baltic Sea Region, EU-28 average, Norway and Iceland, tonnes per capita.



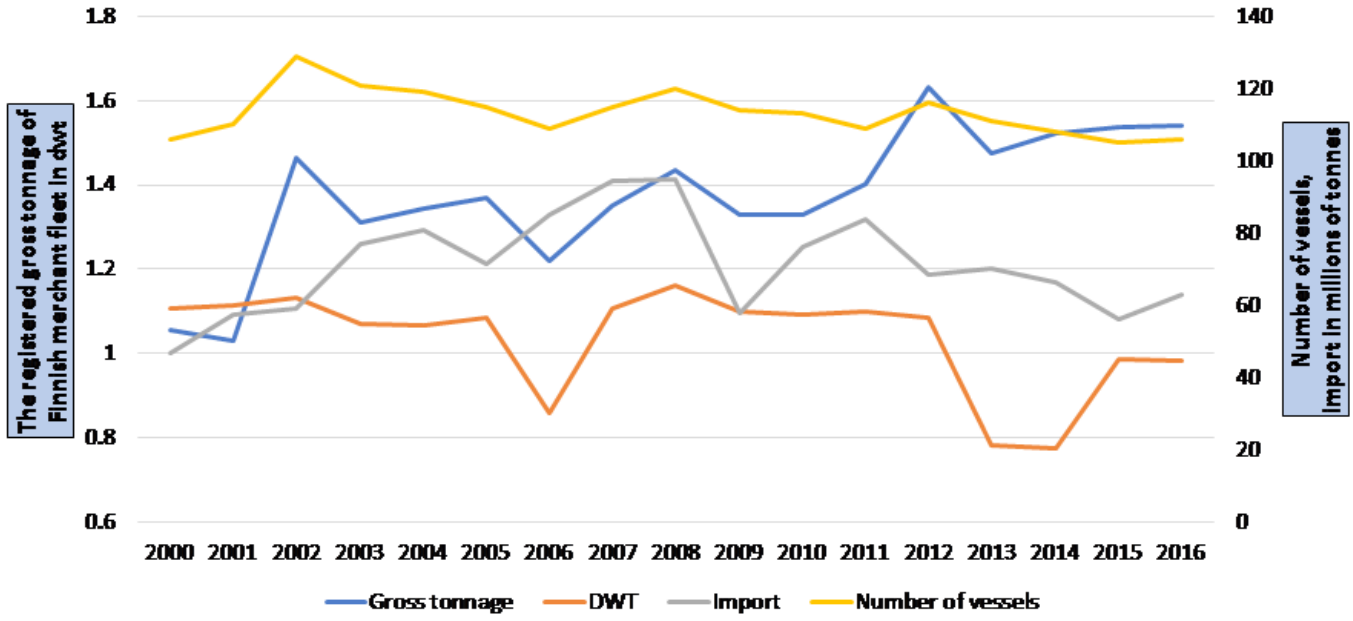
Source: EUROstat Statistics 2015.

The statistics from 2015 show that 1.3 tons of cargo per capita globally was shipped by sea (Stopford 2009, EUROstat Statistics 2015, UNCTAD 2016). In terms of transport performance (as billions of ton nautical miles, tnm), the 2015 statistics show that, by cargo types, 1.6 bn tnm was produced in gas transport, 12.4 bn tnm in oil transport, 8.8 bn tnm in container transport, 15.9 bn tnm in bulk transports, and 15.2 bn tnm in other bulk cargo (UNCTAD 2016).

EUROstat Statistics (2015) show that a little under 7 tons per capita in EU-28 was transported in the EU maritime transports, imports and exports. It has to be noted, in regard to the EUROstat statistic, that Luxembourg, Slovakia, the Czech Republic, Hungary, and Liechtenstein and Switzerland of the EFTA countries do not have ports, which is why they are left out of the statistics. The average for the EU countries in the Baltic Sea region is approximately 16 tons per capita. Finland ranks as third behind Latvia (34 tons) and Estonia (26 tons) with 17 tons cargo per capita per year.

The dependence Finland and Finns have on functional and safe sea access is enough reason to consider Finland an "island". Finland's shipping dependence is 8.4 tons per capita per year in imports, and slightly less in exports, with 8.3 tons per year. With the "island state" concept in mind, the shipping dependence of Latvia and Estonia are comparable with Finland. The shipping dependence of Norway in both importing and exporting cargo is a combined 37 tons per capita per year, and for Iceland it is over 20 tons per year.

Figure 2. The key figures in evaluating Finnish maritime transport security of seaborne supply and their development



Sources: Finnish Transport Agency foreign maritime transport statistic 4/2016; Trafi merchant marine statistics 2013; 14/2014; 2016: 13/2017; Finnish Shipowners' Association's membership statistics 2014, 2016.

A little over half of the 50 million tons of cargo imported to Finland by sea in 2017 was directed to domestic internal consumption. Over half of the exported 50 million tons had first been imported to Finland by sea (Ojala et al. 2018). Imports are the Achilles' heel of Finnish maritime transport. Finland must secure importing first in order to be able to export. The adage "Finland rises when exports grow" ("Suomi nousee, kun vienti vetää") must be examined from the perspective of securing importing and security of seaborne supply.

The key figure curves in the above image about the security of seaborne supply in maritime transport show that, from 2000 to 2016, the tons in foreign trade by sea and the unitless value of tonnage both are on the ascending curve. The deadweight capacity of the tonnage in tons (dwt) and the number of vessels sailing in international traffic are both on the descending curve. It should be remarked as a noteworthy change that little less than a third of the number of SUFF tonnage vessels, and a little less than a third of the capacity has either completely or partially moved to foreign ownership and, consequentially, under foreign decision-making.

2. Government resolutions on the objectives for security of seaborne supply

The government's annual budget proposals have set objectives for the security of seaborne supply in maritime transport. In the budget proposal for 2010[2] it is stated that "from the perspective of security of seaborne supply, a domestic tonnage of necessary capacity is required." Similar objectives have been set between 2011 and 2019. However, there are no actual figures set for sufficiency of tonnage, and the government's budget proposals have not contained earmarked resources for security of seaborne supply. There is a contradiction between objectives and resources.

It seems to be easy for the authorities to set objectives for security of seaborne supply in maritime transport, or to state that the maintenance of the security of seaborne supply requires resources, but allocating them has not been actualised. The government's budget proposals between 2011 and 2019 have not "earmarked" any appropriations for security of seaborne supply. The NESA-managed National Emergency Supply Fund, which is separate from the state budget, covers the expenses for emergency stockpiling, technical back-up facilities, and contingency planning. The annual return of the fund is approximately 40 million euros.

2 In the government budget proposal for 2019, it is evaluated that there are 115 vessels covered by aid in 2019, of which 101 are cargo vessels and 14 passenger vessels. The gross capacity of the vessels listed is evaluated to be approximately 1,500,000 tons in total.

From 1988 onwards, every five years the government has set general objectives for security of seaborne supply. Originally the objectives were determined for material security of seaborne supply. In the implementation done in 1988 it was found that the interim objective of 70 % material level from the full security of seaborne supply objective was too strict. The objective had to be re-evaluated by setting the timeline three years forward. As a conclusion, it can be stated that the resources at hand or available seem to define the setting of objectives. Resources defined the objectives for the set levels of necessity and not the other way around, (as before).

The process, where the government determines the objectives for security of seaborne supply without allocating the required resources, statistically does not seem to develop the safeguarding systems for the security of seaborne supply. Attention might be paid to the government proposal for 2008[3], which states, among other things, that "in a nation like Finland, the need for its own merchant marine is highlighted by the remote location and the dependence of foreign trade on shipping by sea. The current tonnage is generally considered to be at risk levels from the perspective of security of seaborne supply. The number and structure of the necessary fleet has not been defined more accurately" [as long as it is adequate, is the comment of the writer of this report]. The "risk level tonnage of the merchant marine" in 2008 is an empirical indicator of the minimum amount of the evaluated tonnage.

If an example on implementing determined objectives is needed, it can be stated that the objective decision for security of seaborne supply in 2013 was done under Prime Minister Katainen's government. The five-year implementation period of the decision covered both governments of Prime Minister Stubb and Prime Minister Sipilä[4]. The government decision on the objectives for security of seaborne supply had a different meaning from the original decision in the government programmes of Stubb and Sipilä, not mention different resources for security of seaborne supply. The commitment of the new government in maintaining the objectives for security of seaborne supply set by the previous government seems remain low. The objective of security of seaborne supply seem to have become more of a "dead letter", a decision in force that either goes or does not go its own way and that is not followed in practice.

The government resolutions on the objectives for security of seaborne supply are done in five-year cycles, as stated above. This is out of synchronisation with the government's four-year electoral cycles (Sipilä's government resigned approximately five weeks before the next elections). The government taking power may have [and seems to have] a government programme where the legacy of security of seaborne supply may have a different status and importance. Timing, administrative, planning, and implementation issues and breaking points of process are recognisable in the government's determination practices for setting objectives for security of seaborne supply.

3. Tonnage in Finnish use

The number of SUFF sailing vessels has varied from the 106 vessels and 1.16 million tons (dwt) in 2000 to 120 vessels and 1.16 million tons (dwt) in 2008 to 107 vessels and 1.02 million tons (dwt) in 2016.

The SUFF sailing tonnage in statistical year 2017 consisted of 110 merchant vessels that had a combined capacity of approximately a million tons. The Finnish-owned SUFF tonnage share contained 57 vessels suited for shipping cargo, with a combined capacity of 0.75 million tons (dwt). The foreign-owned SUFF tonnage had 24 vessels suited for shipping cargo, with a combined capacity of 0.21 million tons (dwt), little less than 27 %, or nearly a third of the whole SUFF sailing deadweight capacity.

It is noteworthy that the foreign-owned SUFF tonnage is between the capacities of 5,000 and 10,000 tons (dwt), 12 vessels, and between 10,000 and 20,000 tons (dwt), 12 vessels. The smaltonnage has a capacity range of 1,000 to 5,000 tons (dwt), and there were no foreign-owned vessels amongst these 27 vessels. Some of the passenger ferries also belong to this category.

The latest official publication on the Finnish-owned tonnage sailing under a foreign flag and the tonnage freighted from abroad by the Finnish shipowners is from 2013.

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3 HE 148/2008, the central objectives and suggestions of the proposal: 3.1.

4 The 2013 government decision on the objectives for security of seaborne supply was made during the premiership of PM Jyrki Katainen (22/06/2011—24/06/2014) and was in force until December 2018. The premiership of Alexander Stubb lasted from 24/06/2014 to 29/05/2015, and the premiership of Juha Sipilä from 29/05/2015 onwards. The next government decision on the objectives for security of seaborne supply was made in December 2018.

There were 38 Finnish-owned vessels sailing under a foreign flag, with a combined capacity of 1.2 million tons in the statistical year. The tonnage contained 10 ro-ro vessels, 10 tank vessels, and 8 dry cargo vessels. The share of tankers (10) was 980,000 dwt. Tankers owned by the Ålandic Lundqvist have never entered the Baltic Sea.

The 61 foreign-owned vessels sailing under a foreign flag time chartered by Finnish shipowners in 2013, with a combined capacity of 246,441 tons (dwt) consisted of 17 ro-ro vessels, 25 dry cargo vessels, and 19 tank vessels.

It is worth noting that in early 2019 a Turku-based shipowner has time chartered four foreign-owned vessels sailing under a foreign flag with capacity range of 4,000 to 7,000 tons (dwt). One of the bases for time chartering is, according to the shipowner manifest, the 20 % cheaper operating costs of the foreign-owned tonnage compared to the SUFF sailing tonnage. According to Stopford (2009), the operating costs form approx. 14 % of a vessel's total operating costs. The operating costs a formed by storage, lubricants, repair and maintenance costs, insurances, and general costs. The vessel's staffing costs form up to 42 % of the operating costs, which constitute 5.8 % of the full cost. Besides the staffing costs, other expenditures are standard. The 20 % difference in operating costs between SUFF sailing and sailing under a foreign flag seem to be significant.

Table 1. Tonnage categories grouped by ownership, register, and national flag

TONNAGE CATEGORY	NUMBER OF SHIPS IN TONNAGE	TONNAGE CAPACITY, DWT	IMPORTED GOODS IN TONS	THEORETICAL CAPACITY IMPORT TONS / DEADWEIGHT TONS
TONNAGE SAILING UNDER THE FINNISH FLAG (SUFF)	110 VESSELS	1.0 MIL. TONS	47.3 MIL. TONS	47 IMPORT TRIPS PER YEAR, A TRIP PER WEEK ... IF ONE WAY IS SAILED EMPTY 2 x 47 = 94 ROUND TRIPS, 1.8 TRIPS PER WEEK...
FINNISH-OWNED TONNAGE (Special vessels, tugboats, and icebreakers are not included.)	57 VESSELS	0.75 MIL. TONS	47.3 MIL. TONS	63 IMPORT TRIPS PER YEAR, 1.2 TRIPS PER WEEK ... IF ONE WAY IS SAILED EMPTY 2x63 = 126 ROUND TRIPS, 2.4 TRIPS PER WEEK...
FINNISH-OWNED TONNAGE SAILING UNDER A FOREIGN FLAG (*2013* last collected statistics)	38 VESSELS 10 RO-RO 10 TANKERS 8 DRY CARGO	1.19 MIL. TONS		
TONNAGE FREIGHTED FROM ABROAD BY FINNISH SHIPOWNERS	61 VESSELS 17 RO-RO 25 DRY CARGO 19 TANK VESSELS	246,441 TONS DWT AVG. 14,500 TONS DWT 168,651 TONS DWT AVG. 6,750 DWT 209,356 TONS DWT AVG. 11,020 DWT		

Sources: Trafi 26/2013, Suomalaisten varustamoiden ulkomailla rekisteröidyt ja ulkomailta aikarahtaamat alukset 2013 (latest); Trafi 15/2018, Merchant marine statistic 2017, LiVi 4/2018; Foreign maritime transport statistic 2017.

4. Evaluating the capacity of the tonnage sailing under the Finnish flag

The number of vessels included in a sufficient tonnage depends on the current situation, i.e. the security situation in our environment. When considering sufficiency, the central element is threat to maritime transport and the effects of its ramifications. The amount of tonnage cannot be measured in a vacuum, as such. When creating scenarios for security of seaborne supply, we can examine a situation, where we cannot import crucial energy and raw materials from east, for example. An optional situation could be one, where these commodities have to be imported from west, even from outside the Baltic Sea region.

Figure 3a. The total imports of Finnish maritime transport and its transport performance

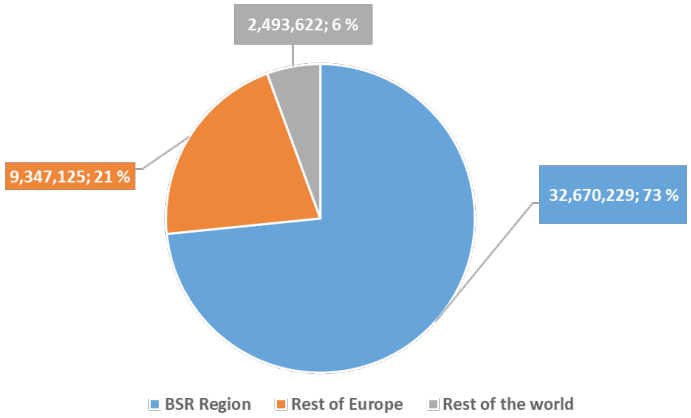
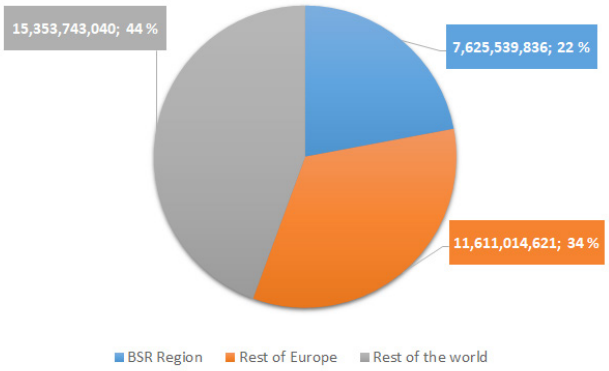


Figure 3b. Haulage required for total Finnish maritime import in tonnes in 2015.

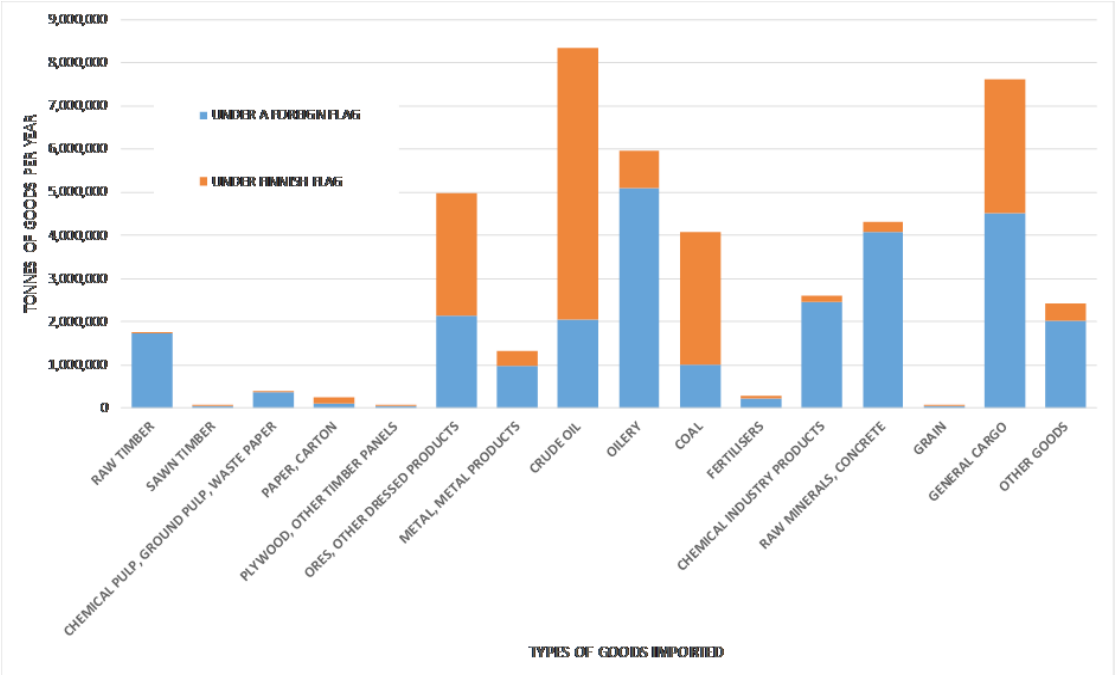


Sources: FTA's foreign maritime transport statistic 2015. (FTA statistics of 4/2016) augmented with data from the information department of Finnish Transport Agency.

In statistical year 2015, 44.5 million tons were imported by sea to Finland, of which 73 % (32.7 million tons) where from the Baltic Sea region, 21 % (9.3 million tons) from elsewhere in Europe, and 6 % (2.5 million tons) from elsewhere in the world. The whole transport performance transporting to Finland was around 34.6 bn ton nautical miles. The Baltic Sea region share was 22 % (7.6 bn tnm), the rest of Europe 34 % (11.6 bn tnm), and the rest of the world 44 % (15.4 bn tnm) (image 3). Should we here in Finland have to change our import direction to west, for one reason or another, in this scenario the "west" grows as the need for transport capacity and transport distances grow. In order to secure supply for maritime transport it should be evaluated with anticipation what kind of and how large a tonnage Finland should have in this kind of situation, in order to manage the need for capacity for securing the supply. This follow-up question can be asked: Where will Finland get the possible lacking tonnage resources?

When considering the tonnage distribution of Finnish imports by types of goods, it can be stated that for 16 types of imported goods the share of foreign vessels in cargo tons is over 50 % for raw wood, oil products, fertilisers, raw minerals for chemical industries and cement, groupage, and other goods. It is remarkable that Finland is significantly dependent on the blue-marked transport share of foreign vessels sailing under a foreign flag for essential goods in normal conditions (Figure 4).

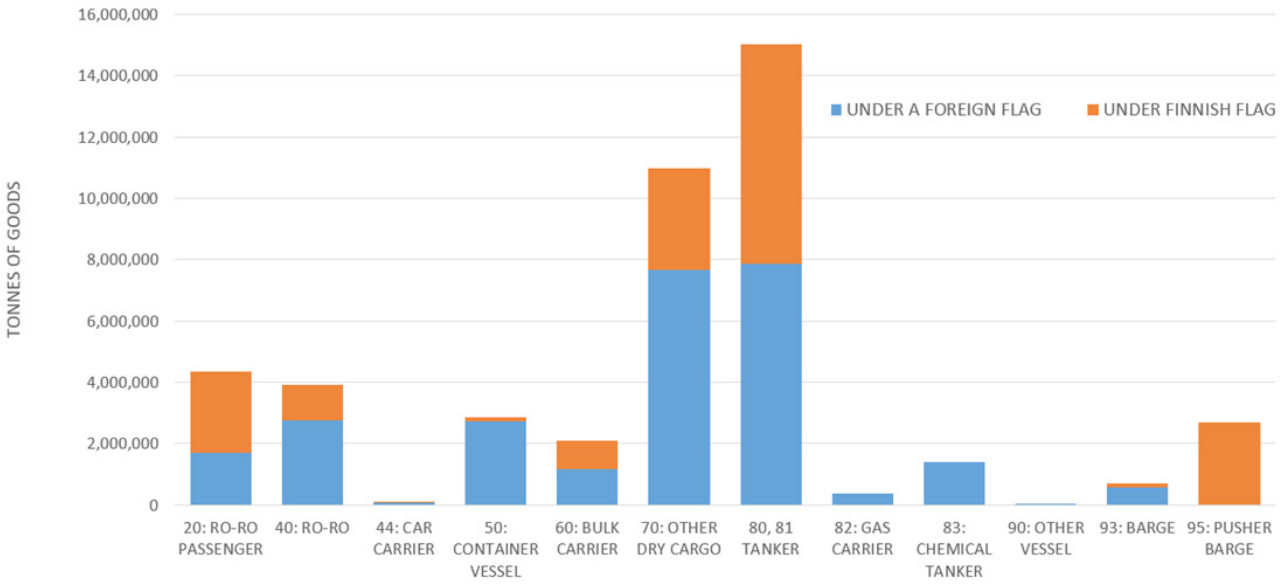
Figure 4. The amount of imported goods in Finnish maritime transport in 20015, measured in tons, grouped by types and categories of goods, under a Finnish flag, under a foreign flag.



Sources: FTA's foreign maritime transport statistic 2015, augmented with data from the information department of FTA, foreign import, all vessels, SUFF.

When considering the tonnage distribution of Finnish imports by types of goods, it can be stated that for 16 types of imported goods the share of foreign vessels in cargo tons is over 50 % for raw wood, oil products, fertilisers, raw minerals for chemical industries and cement, groupage, and other goods. It is remarkable that Finland is significantly dependent on the blue-marked transport share of foreign vessels sailing under a foreign flag for essential goods in normal conditions (Figure 5).

Figure 5. Finnish maritime transport imports by vessel type in 2015



Sources: FTA's foreign maritime transport statistic 2015, augmented with data from the information department of FTA, foreign import, all vessels, under Finnish flag. Vessel type numbering according to MTS (Maritime Transport Statistic).

As an example of the sufficiency or insufficiency of SUFF tonnage, the changes in one-way trips for a Finnish bulk cargo shipowner's tonnage have the following effects: When getting cargo from the Gulf of Finland region, the tonnage is enough for a 100 trips per year. When getting cargo from southern Baltic Sea, the tonnage is enough for 50 trips, and when going beyond the Danish straits, the tonnage is enough for 25 trips per year. As the trips get longer than this, the bulk cargo tonnage is not enough, and additional capacity is needed.

When evaluating crude oil transports, the current two crude oil tankers SUFF are enough for retrieving the oil from Primorsk. For getting crude oil from Rotterdam in Netherlands, for example, four crude oil tankers are needed for transporting the same annual amount of oil.

The 30 % share foreign transports done by the SUFF sailing tonnage can be presented not as an average, but as a share of the vessels sailing under a foreign flag, which is 60 % in imports and 80 % in exports.

In statistical year 2015, the tonnage sailing under a foreign flag transported to Finland over 60 % of goods in ro-ro transport, over 90 % in container transport, over 70 % in dry cargo transport, and over 90 % in gas tank, chemical container, and barge transport. In terms central vessel types, we in Finland are very dependent on the capacity performance of foreign-owned vessels sailing under a foreign flag. It should be noted, as a curiosity, that there are no SUFF container ships transporting to Rauma, the largest container port in the Gulf of Bothnia (Asumalahti 2019).

The ownership of a vessel matters. In a free market economy, the owner determines the use of the vessel, chooses the register and flag under which it sails accordingly. The following example is about road transport: Turun Sanomat (2019) reported on the significance of the ownership of a transport vehicle in the domestic road transport and how it affects the maintenance of a bus route. An operator stops operating between two settlements. The reason for this is the unprofitability of maintaining the route. Because of this, the municipal economic development board wants to continue maintaining the route, and turns to the city and the Centre for Economic Development, Transport and the Environment for Southwest Finland. In order to maintain an unprofitable route, the solution is to turn to an authority for help or aid. The road transport example shows that when free market economy does not produce sufficient financial gains for the owner, the owner either stops maintaining the route, looks for a cheaper solution for their business, or turns to the authorities for help. In maritime transport, time chartering a vessel sailing under a foreign flag seems to be financially efficient from a shipowners' perspective. Securing financing and arranging for collateral seem to be very high obstacles when it comes to acquiring owned tonnage.

In the recent public discussions and considerations on different approaches, it has been stated that cooperation between the public and private sectors are needed for the actions that are the responsibilities of the government and public administration. The Minister of Finance stated in Ilta-Sanomat (13/03/2019) that "it should be maintained that the public operator is the master and private operator is the servant". (Ilta-Sanomat 2019).

As for maritime transport, it has been stated on behalf of Trafi (now Traficom) that "maritime transport functions [freely, writer's addition] under market terms and in the guidance of supply and demand", and that "securing the security of seaborne supply in maritime transport is primarily based on the volunteering of companies". (Österlund 2019:112, 149, 276, 300).

In the government and public administration roles described above, it is noted in the first example that the authorities should have a strong grip, whereas in the following example focuses on the voluntariness of companies.

5. Evaluating the government-run control (and management) of maritime transport

Control of maritime transport is legislated in the Vessel Traffic Service Act (VTS Act)[5]. Its purpose is to further vessel traffic security, to better efficiency, and to prevent adverse environmental effects caused by vessel traffic, as well as produce traffic notifications, give navigational aid, and to implement vessel traffic arrangements.

Notifications are given to a vessel when necessary, when the vessel signs up for vessel traffic service, or when information is requested. The notifications contain information relevant to safe navigation and transport. The vessel is the active operator here. VTS follows the movement of vessels and notifies them on impending dangers when necessary. Navigational aid can be legally given to an identified vessel when requested or when deemed necessary by the VTS centre. It must be noted that navigational aid only target-oriented and directive. The responsibility of ship control remains with the captain of the vessel.

5 Vessel Traffic Service Act 623/2005, Section 17 a.

Decision-making powers always remain with the captain of the vessel. For controlling maritime transport, the VTS authorities have the right to prohibit:

1) the vessel from entering or leaving the VTS area;

2) from entering a port or anchoring;

3) leaving a port or anchoring place;

4) remaining in the VTS area, port, or anchoring place.

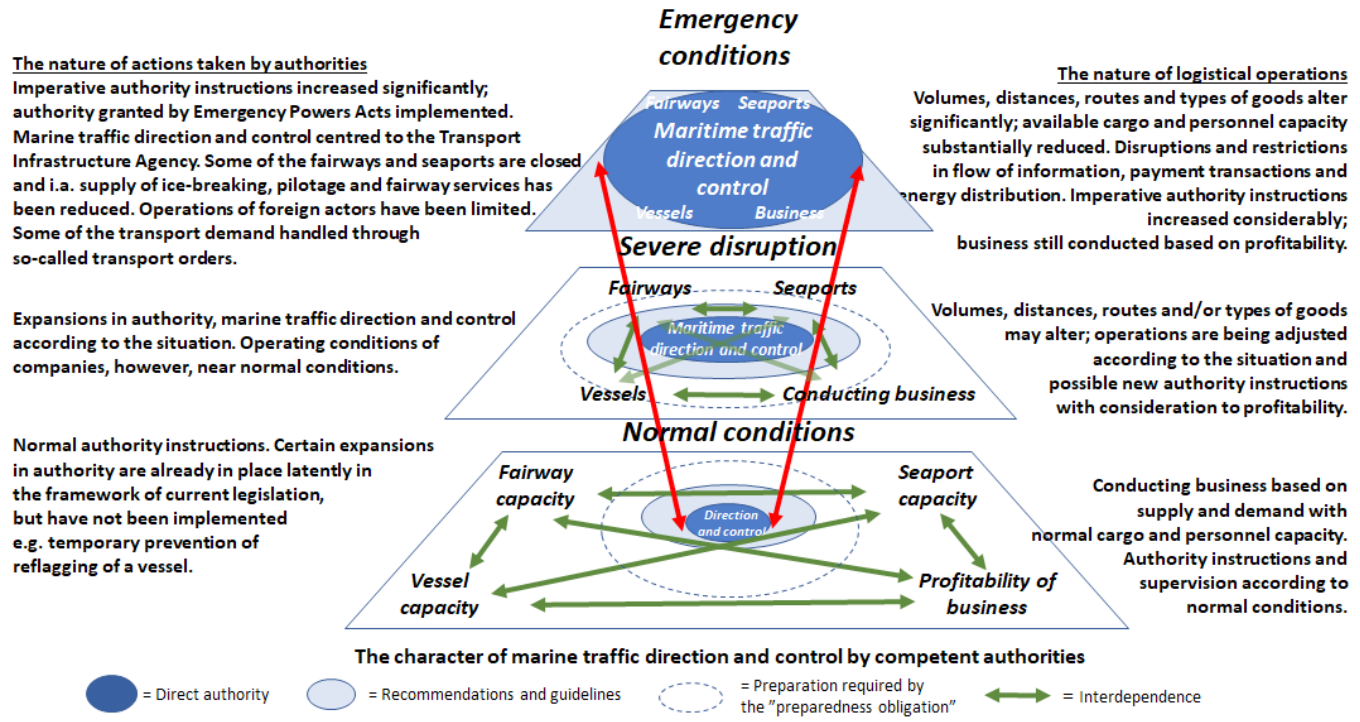
The jurisdiction of VTS does not include a right to order the choice of arrival port of the vessel. In cases where the vessel is prohibited from entering a pre-determined port of entry, the vessel chooses an alternate port. If the original port of entry was to receive multiple vessels carrying import cargo, each port can choose a new port of entry. Coordinating port functions, further transport, change of transport methods, and storage in a situation described above requires coordination, harmonisation, and resource allotment and prioritisation, as there are not enough for all.

Management of maritime transport lacks the necessary tools. Unrestricted flow of goods requires both guidance and management in this kind of situation.

In figure 6 of the "Merenkulun huoltovarmuus ja Suomen elinkeinoelämä – toimintaympäristön tarkastelu vuoteen 2030" report, focusing on the maritime transport control over security situations and on the nature of jurisdiction, the image describes nature of actions by authorities and by logistic functions from the perspective of changes in jurisdiction in relation to the controlled or managed vessel. Instead of focusing on examining the nature of actions by authorities and logistic functions, this study focuses on the securing the continuity of maritime transport system in accordance with the preparedness obligations and jurisdictional readiness of both authorities and maritime transport operators.

The dependencies of jurisdiction are described in three stages, from bottom to top: in normal situations, in serious disturbances, and in emergency conditions. The preparedness obligations and responsibilities of the maritime transport operators are based on the Maritime Emergency Act, and are the core control factors and points of examination in this image.

Figure 6. Evaluating the jurisdiction of authorities in the control and management of maritime transport



Source: Ojala et al. 2018:32.

Control and management of maritime transport expands in different security situations, beginning from a normal situation to serious disturbances to emergency conditions. The volume of control and management grows as described by the growing sector in the image.

The responsibility that comes with the implementing powers of leadership has been uniformly allocated to the captain of the vessel. Their responsibility is to make the decisions regarding the course of the vessel. When maritime transport control and management is compared with aviation, the difference is in the air traffic controller giving each plane a speed, direction, and altitude at which they can proceed. An air traffic controller evaluates it themselves, and have an unequivocal management responsibility. The flight manifest contains possible organisational requirements for changing the destination airport. In maritime transport, possible organisational requirements caused changes to a port of entry are not prepared, and the vessel transport service does not have a similar management responsibility.

VTS has the right to prohibit a vessel from entering or leaving the VTS area, if required by conditions. In case VTS prohibits a vessel from entering the area or a port, the captain chooses a new port of entry on a case-by-case basis. In situations like this there might be several vessels targeted by the VTS-prohibition. The target vessels choose new ports of entry regardless of one another. This leads to the re-organising of a whole road transport chain. For example, moving the cargo of a 70,000-ton (dwt) vessel from the port onwards requires approximately 2,000 railway cars. If there are three vessels arriving at the same time, the required number of railway cars is 6,000. The bottleneck is caused by the limited number of available railway cars, as there are approximately only 8,500 of them in Finland. In order to manage the above situation, it requires a responsible operator that coordinates between the different transport forms, and controls and manages traffic. Maintaining preparedness requires planning, preparing and coordinating transport forms, traffic control, and managing transport chains by a responsible operator.

The coordinating operator shares limited resources with the different logistical operators in the above scenario. Raimo Luoma, Chief Executive Officer of NESA, (2018) stated at the end of last year that the significance of ports and logistics centres for security of seaborne supply has to be re-evaluated. Let us hope that the evaluation by NESA includes the whole logistics chain from sea to ports, from ports to sea, and road and rail transports to and from ports. Storaging principles will have an important role in the evaluation. Based on an expert evaluation, in order to maintain transport continuity, storage facilities are always needed in places, where transport forms are changed (Asumalahti 2017).

The coordination of a logistics chain should be under the responsibility and control of authorities and public administration.

6. Summary and conclusions

In Finland, the securing of security of seaborne supply relies on the legally mandated regulatory roles of authorities on one hand, and on the other hand it relies on the commercial principles of free market economy followed by businesses. The authorities guide the security, responsibility, and security stockpiling actions, based on statutory requirements. The number of SUFF sailing tonnage is defined as "sufficient tonnage", which does not have a precise or even directive boundary conditions. Businesses support security of seaborne supply functions, guided by free market economy and based primarily on voluntary actions.

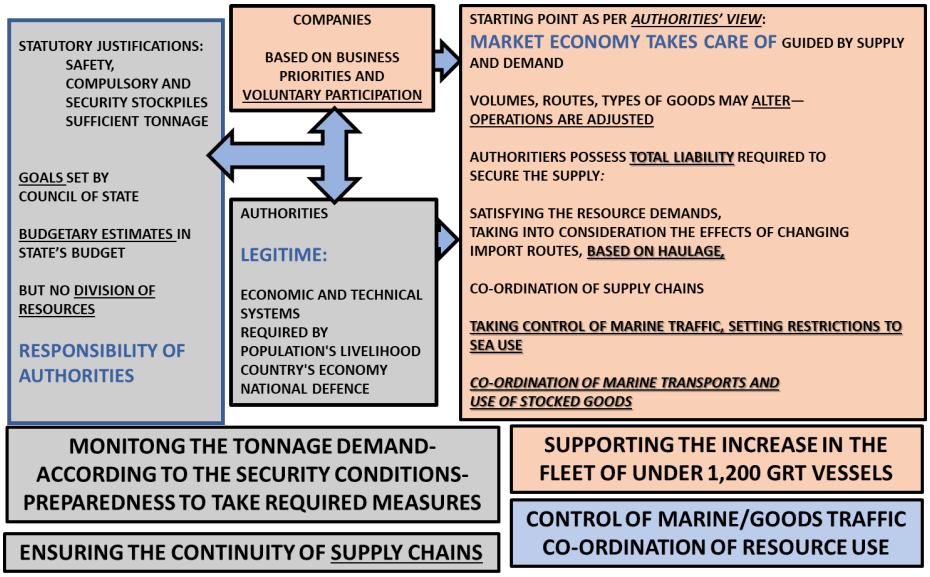
The objective-setting for security of seaborne supply does not define the implementing operator, nor provide the resources for reaching the objective and for its maintenance. The harmonisation of market powers and authority-controlled security of seaborne supply functions with possible division of responsibilities is not realised. Based on the research material, the mainly voluntary resourcing of security of seaborne supply by businesses does not result in the fulfilment of set objectives.

In figure 7, on the left side with a light grey indicator, the regulatory requirements of securing the security of seaborne supply by authority actions is described together with their functional dimensions, responsibilities, and components of security of seaborne supply. On the right side, indicated with light red markers, is the role of businesses in securing the security of seaborne supply.

In a free market economy, the business world operates based on supply and demand and profitability. In the basic plans for developing security of seaborne supply, designed by K.H. Pentti (1980) in 1978, it was noted that "without the voluntary, active influence of businesses, government resources are limited". The problem is that introducing security of seaborne supply to foreign-owned companies operating in Finland seems to be very challenging. Involving domestic operators in security of seaborne supply work or keeping them informed and involved in general is also challenging.

Besides free market economy, voluntariness and the operational possibilities created by supply and demand are highlighted in business. In a market economy both businesses and consumers decide independently what they want to consume and produce, and how they allocate their resources without government intervention.

Figure 7. The responsibilities and implementation requirements of Finnish maritime operators in securing the security of seaborne supply for maritime transport.



It is crucial how the outcomes produced by business sector are directed, i.e. whether there will be resources left to allocate for developing the security of seaborne supply in Finland. The residency of companies matters. Due to the subsidiary-based economy, security of seaborne supply does not have similar position nor patriotic meaning in foreign-owned companies as they do in Finnish-owned companies.

Government resolutions on the objectives for security of seaborne supply determine the securing of supply in maritime transport, and combine preparedness, forecasting, and preparations. Timing, administrative, planning, and implementation issues and breaking points of security of seaborne supply processes are recognisable in the government's determination practices for setting objectives. The current five-year period system for deciding objectives for security of seaborne supply should be combined with terms of government. Determining objectives for security of seaborne supply should be a part of the government programme for a new government. Currently the objective setting for security of seaborne supply is following its own path, separate from the political decision-making for allocating government resources, which is why it is more separate than binding. The follow-ups conducted by the Prime Minister's office do not seem to extend to monitoring the realisation of the set objectives.

The resources required for the implementation of decisions on security of seaborne supply are not in line with the decisions made. The government budget does not have earmarked finances for securing the security of seaborne supply. The 40-million-euro profit of the National Emergency Supply Fund managed by NESA is not directed at securing the security of seaborne supply in maritime transport, but it is directed for maintaining security stockpiles. There is a contradiction between objectives and resources. The responsibility of authorities is not established sufficiently.

The transport capacity and number of vessels in the tonnage sailing under the Finnish flag have been on an descending curve for this current millennium. The share of SUFF sailing tonnage in Finnish foreign trade dropped under 50 % in the early 1980s already. As the share of Finnish tonnage has been dropping, the share of foreign-owned tonnage has consequentially grown, and dependence on this tonnage has increased. The share of Finnish-owned and Finnish-operated tonnage SUFF has already dropped under 75 percent. The Finnish-owned tonnage SUFF has 50 % shares in only four cargo types, mainly energy and raw materials. The dependence on tonnage sailing under a foreign flag is over 60 % in four vessel categories: ro-ro, container, dry cargo gas, chemical container, and barge transport. The growing foreign share of ro-ro transport is added to by the transport capacity of SUFF sailing foreign-owned tonnage.

The general objectives and undetermined obligations for securing the security of seaborne supply do not form [sufficient] basis for planning and implementing the objectives. The share of SUFF sailing tonnage in foreign maritime transport as well as in the government budget for 2016 is stated to have settled at over 30 %. Presenting the following question is justified: Does this mean that the share is enough or should it be raised? It seems that the

authorities are satisfied with the established current share level of tonnage. Describing the share of SUFF sailing tonnage with an average is not enough for addressing concrete deficiencies in vessel types, such as the small, approx. 10 % share of container, gas, and chemical vessels.

In the decision-making process and capacity evaluations by authorities it is necessary to use similar, agreed concepts and definitions for all, such as, for example, the deadweight capacity of a vessel, measured in tons, with tonnage measured as unitless, based on a logarithmic volume function. It seems to be easier to choose 1.6 million [unitless] than 1.0 million [tons] as the basis for evaluation.

The options for growing the transport capacity required by the "sufficiency" of tonnage are either to acquire the necessary vessels for direct ownership, or to create and maintain an organisation that can quickly rent additional tonnage from market places. This may affect the options for adding to the necessary SUFF sailing tonnage and transport capacity under domestic decision-making. Acquiring owned capacity has its challenges and issues. Ordering newly built or buying a used vessel requires both finances and planning resources, which in turn requires expert personnel that is constantly up-to-date on current developments. The basic principle tends to be "buy cheap, sell expensive". It is necessary to be at the confluence of these factors at the same time with either the seller or the buyer. Determining the right time to buy requires an ability to read the markets.

Buying, selling, or chartering additional tonnage capacity requires speed from both decision-making and implementation in order to fulfil the transport deficit. This, in turn, requires resources, preparations, and constant monitoring of maritime transport conditions based on the unified situational understanding of all operators.

The development in the number of SUFF tonnage, influenced by shipowners, follows the supply and demand rules of free market economy. There must be a system in place for the changing [additional] vessel needs, should there be disturbances or interruptions in the market mechanisms. A government-run resource must be created to function alongside private businesses [shipowners] in order secure the acquisition of vessels for use. Transport arrangement can be based on using chartered tonnage sailing under a foreign flag, or on privileged transport arrangements or pre-prepared transport orders for SUFF sailing tonnage.[6] In the winter of 2010-2011, when sea ice was heavy, there were no pre-defined prioritisations of maritime transport or privileged arrangements made by the authorities. Vessels were assisted based on the order they arrived in the waiting area ("First in, First out").

The approximately 60 vessels sailing under a foreign flag and time-chartered by Finnish shipowners formed a tonnage of which 82 % was chartered from the EU-28 and 11 % from outside EU. It is also worth noting that the chartered vessels were ro-ro, dry cargo, and tank vessels. The chartered tonnage primarily complements "supply", and is cheaper than domestic tonnage, thanks to its lower operating costs. Acquiring tonnage as newly built or used is problematic for getting the loan and collateral needed, according to experts. In the interview section of the doctoral research, many of the interviewees stated that acquiring at least ten vessels would be necessary, but the financial resources were not there.

It is also noteworthy that a portion of the time-chartered tonnage is between 5,000 tons and 7,500 tons. The usability and possibilities of this tonnage is increased by the lower fuel consumption and shallower operating draught that makes operating in the archipelago possible. For example, there is a bridge-crossing with a clearance height of 36 metres over a 6.8 metre shipping lane on west side of Öland. The recommended draught of 7.2 metres in the Danish straits and in Øresund stopped a SUFF sailing container vessel in full cargo for a few days a few years ago. The water was low at that time.

Statistics are central source for observing the development of foreign maritime transport, and in evaluating the efficiency of the maritime transport system and the possible bottlenecks created by disturbances. They also help with identifying what needs to be changes, and how maritime transport and shipping can be developed. The more dependent Finland is on our maritime connections, the more important it is to create and maintain a forward-thinking, reactive transport system with necessary alternative solutions. The world is changing and so are transport systems, based on supply and demand and their boundary conditions.

The core factor of maritime transport, the sufficient amount of tonnage, is dependent on the both amount of goods transported and the current security conditions — not just as a thread, but as a fact in normal conditions. Determining the possible and likely needs for tonnage are possible to realise as transport performance measured in ton nautical miles. Evaluating the need for tonnage is based on mapping the central maritime transport scenarios before-hand and in normal conditions. The basis of this evaluation should be the now-lacking official, authority-collected statistics that also contain the necessary maritime transport factors, and a forecasting plan

6 The author was in contact in the winter of 2010-2011 with the then-Director General of the Finnish Transport Agency, Tiina Tuurnala, who confirmed the basic principles of prioritisation written in the press release. It was instructed that the NESA product manager should be contacted in case of emergency.

for the possible changes in collection ports as an increasing or decreasing factor for transport needs. As a result, this evaluation produces a goal state, informed by different security conditions, for tonnage need and its possible increases. Material requirement planning for tonnage facilitates the directing of the whole securing process in maritime transport. The division of responsibilities between the authorities and private sector must be done in normal conditions.

A more active model for monitoring the security conditions in maritime transport is presented at the bottom of image 7, as well as the preparedness for action required by any change to this monitoring. The maintenance of the continuity in the supply chain in international maritime transport is also presented. The aim of these is to develop regulatory action. The control and management of maritime transport and the coordination of resources in transport chains regardless of transport form has to be organised by authorities and their actions. The shipowner sector expects acquisition support for SUFF sailing small tonnage.

The tonnage is sufficient for performing the maritime transport required by the current situation controlled by market powers. However, if the balance of market powers is disturbed, it is likely that imports must be retrieved from further away, which means that we must at least prepare for increase in transport performance needs.

We primarily rely on the unrestricted market mechanism of supply and demand in shipping, maritime transport, and transporting goods by sea. However, each party operates based on their own objectives, and as Adam Smith stated in his 1776 book "An Inquiry into the Nature and Causes of the Wealth of Nations"[7]: "[F]rom their regard to their own interest." This multifaceted mechanism reaching towards balance must be controlled when disturbances occur, and it must be steered over the obstacles and disturbances in free market economy. It is not enough that the invisible hand of Smith works, if it works. In order to navigate the issues raised by security of seaborne supply in maritime transport, it is not enough to have beacons, buoys, sector lights, or any other sea marks, nor is it enough to have satellite navigation or mechanisms of free market economy, not even "the invisible hand". A controlling hand is required, and it must be prepared to act when situation demands it. A quick and flexible planned transition to control and management operating outside the markets requires planning, preparing, forecasting, the implementation of the visible hand and raising its preparedness.

If we want to develop and set the securing of security of seaborne supply on an ascending curve here in Finland, and grow the transport performance share of SUFF, we must take concrete action and direct the necessary resources to this endeavour in order to reach the set objectives. The securing system for the security of seaborne supply in maritime transport must be prepared for facing new challenges that arise from more demanding, difficult, and economically unprofitable conditions. The full responsibility of harmonising the preparative actions for security of seaborne supply is on the authorities.

7 Adam Smith (1776:369) writes: "How a certain capital can be maintained does not depend on the nature of the trade: It depends, in part, on the difficulty of transporting the goods in relation to their value, and partly on how they are transported between distant ports; and of these two, it depends on the previous one. Therefore, if the kingdom's capital is forced by a greater incentive for a greater proportion of sea freight than would naturally be there, there will not always be an increase in sea freight in this kingdom."

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