

---

## 1. Unknown importance of high-sea shipping for Switzerland

As 90 % of world trade is carried by ships, maritime shipping is considered as the backbone of international trade and the global economy.<sup>1</sup> On the one hand, being landlocked and located in central Europe, Switzerland lacks direct access to the sea. On the other hand, however, Switzerland's foreign trade ratio<sup>2</sup> is among the highest of all countries worldwide and has further increased over the last decade, reaching 117% in 2019.<sup>3</sup> This figure reflects Switzerland's high extent of economic openness, higher compared to EU-28 states which have a foreign trade ratio of 90%. Accordingly, with countries such as the United States of America, China, India, Hong Kong and Japan, five of the ten most important export markets by value are located outside Europe. Reliable and efficient freight transport flows are therefore crucial for keeping the country's global supply chains running. How can Swiss companies keep up global supply chains despite the lack of access to the sea, when maritime trade is of such global importance? Of which relevance are individual modes of transport in this context?

As the route between Europe and the Americas, Oceania and large parts of Asia cannot be crossed by truck or train – air and sea freight are in many cases the only possible modes of transport in international trade. Especially intercontinental trade flows rely on high-sea shipping as a means of transport. As the volumes transported by air freight are very low, the question arises as to the significance of maritime transportation in securing Switzerland's export and import supply chains.

A recent study published by IG Air Cargo Switzerland has highlighted the importance of the air freight logistics industry for the Swiss economy. The study states that air freight opens up global trade markets for Switzerland and is particularly relevant for high-value and time-critical goods. As sea and air freight are the major modes of transport for intercontinental trade, they take a systemically relevant role for Switzerland's economic development and make a decisive contribution to securing prosperity and jobs in Switzerland. Accordingly, 50% of all exports by value (CHF 157 billion) left Switzerland by air freight in 2019, even higher when only considering intercontinental trade. However, the volume share of air freight is limited, below 1% of total exports and imports which indicates the dependency of intercontinental trade on maritime shipping.

### Study objective

At present, the economic significance of maritime transportation for the Swiss economy is not well understood. Neither public nor policymakers are aware of the extent to which Switzerland's trade flows depend on high-sea shipping. This study addresses the existing gap and aims at shedding light on the subject. The primary study objective is to highlight the importance of high-sea shipping for the trade flows of the Swiss Confederation. Therefore, quantities and values of Switzerland's maritime trade flows will be estimated differentiated by commodity groups and vessel types.

---

<sup>1</sup> UNCTAD (2020). Review of Maritime Transport 2020; International Chamber of Shipping (2020). Shipping and World Trade: Predicted Increases in World Seaborne Trade, GDP and Population

<sup>2</sup> defined as sum of imports and exports as percentage of country GDP

<sup>3</sup> Swiss Federal Customs Administration (2020). Foreign trade statistics.

---

## Structure of the White Paper

The White Paper is structured as follows. Chapter one provides a starting point, outlining the circumstances of the Swiss shipping industry and the economic profile of the country. Subsequent paragraphs comprise the geographical conditions of freight flows and points out the need to analyse the role of the Swiss shipping industry and the country's dependence on it in detail. This also indicates the challenges with regard to the data basis as maritime shipping is not adequately represented in official Swiss trade statistics. Chapter two focuses on international trade flows identifying inbound and outbound supply chains and Switzerland's major trading partners and characterising the transport mode of high sea shipping. Chapter three presents the methodologic approach, results and interpretations of the analysis conducted in this study. Chapter four examines the development of high sea shipping in a global context in order to provide an outlook and trends relevant to the Swiss Confederation.

### Switzerland's geographical conditions regarding high-sea shipping

Due to geographical aspects, air and sea freight are the only viable modes of transportation on some trade routes in international trade. Intercontinental trade flows, in particular rely on high-sea shipping as a means of transport. Switzerland is one of the only few European countries being landlocked, having no maritime coasts. The only access from Switzerland to any seaport via ship is along the river Rhine connecting the Swiss Rhine ports in the region of Basel to some of the major European ports: Rotterdam, Antwerp and Amsterdam named as ARA-range.<sup>4</sup> At the same time, the inland waterway connection to the ARA-range is of strategic importance for Swiss trade flows. In 2019, 10% of imports and 5% of exports by volume were transhipped via the Swiss Rhine ports<sup>5</sup> giving the Basel region an important gateway function. In order to enable the flow of goods between Switzerland and seaports, goods are either transported across the Swiss border by road, rail or inland waterways – both in upstream and downstream transport stages. Due to its location, Switzerland also has an important function as transit country for North South freight traffic often carried by rail. This circumstance is supported by infrastructural measures such as the New Railway Link through the Alps (NEAT) for both more and faster north-south rail links across the Swiss Alps and a reduction in truck traffic across the Alps.

Especially in intercontinental trade, Swiss export and import supply chains need to be operated as multimodal transport processes accordingly, combining several modes of transport in order to secure the end to end transport of goods to its final destination. Swiss exports and imports usually transit through North Sea, secondarily through Mediterranean ports. Especially when trading bulk goods with countries outside Europe, ocean-going vessels in the shape of bulk carriers are used almost without exception.

---

<sup>4</sup> The ports of Antwerp, Rotterdam and Amsterdam are referred to as the ARA-range

<sup>5</sup> Swiss Rhine Ports (2020). Rheinhafenverkehr nach Gütergruppen 2019; Swiss Federal Customs Administration (2020). Foreign trade statistics.

## Switzerland as a shipping nation – ranked 10<sup>th</sup> worldwide and 4<sup>th</sup> in Europe

Even though Switzerland lacks direct seaport access, the Swiss shipping industry is not to be underestimated. A total of more than 900 ships are operated by companies based in Switzerland. Among them are important global players in the sector such as MSC Mediterranean Shipping Company, a company registered in Geneva since 1978. With a fleet of more than 550 ships is the second largest container shipping company in the world behind the leader Maersk from Denmark. Not only does the maritime sector contribute 0.4% respectively CHF 2.4 billion to the Swiss Confederation's GDP and directly employ more than 2,000 people.<sup>6</sup> According to recent statistics from Danish Shipping referring to IHS Seaweb, Switzerland is ranked 4<sup>th</sup> in Europe and 10<sup>th</sup> in the world in terms of gross tonnage of the merchant fleet operated by companies based in Switzerland.<sup>7</sup> The global merchant fleet consists of more than 98,300 vessels, corresponding to a total gross tonnage of 1.42 billion, of which Switzerland's 56 million represent a share of 4%.

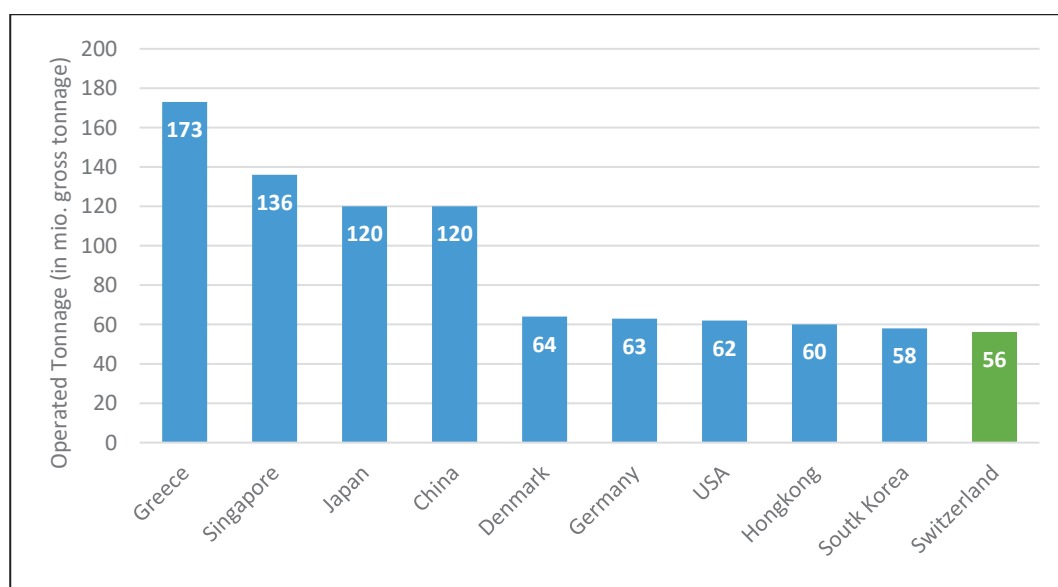


Figure 1: Global merchant fleet by operator nation - top 10 by July 2020.<sup>7</sup>

In recent years the Swiss shipping industry has experienced a profound crisis, especially in Switzerland. The disappearance of certain ship owners or operators has led to a significant decline in the Swiss-flagged fleet. While in 2016, the Swiss fleet comprised 50 cargo ships from six ship owners this number reduced to slightly more than 20 ships sailing under the Swiss flag.<sup>8</sup> Having ships under the Swiss flag generates tax revenues for the Swiss state, and at the same time also strengthens the country's voice at the United Nations International Maritime Organization to advocate its own interests.

### Official statistics do not reflect the relevance of maritime shipping for Switzerland

As the capacity of high-sea vessels exceeds by far size and weight restrictions of the river Rhine, high-sea vessels cannot reach ports in Switzerland. Official customs statistics regarding volume and value

<sup>6</sup> Swiss Trading & Shipping Association (2021). Switzerland, a maritime nation.

<sup>7</sup> Danish Shipping based on IHS Seaweb (2020). Ultraflash - Stability in the Danish Operated Merchant Fleet 2020 (data by July 1<sup>st</sup>, 2020).

<sup>8</sup> UNCTAD (2020). Review of maritime transport 2020.

of exports and imports reflect the means of transport used when crossing the border into or out of Switzerland. High-sea shipping is not listed as mode of transport. Intermodal supply chain operations are not adequately reflected in customs data. The issue becomes obvious when looking at an example: Imports from MERCOSUR countries were 325,475 tonnes in 2019, of which rail accounts for 61,127 tonnes (18.8%), truck for 88,887 tonnes (27.3%), air for 1,505 (0.5%) and inland waterways for 173,885 (53.4%). The share of rail and truck can only represent the route between European seaport and import destination in Switzerland. The main run between South America and Europe has most likely been carried by high-sea vessel as the air freight share of 0.5% is neglectable. This assumption is backed by European port data<sup>9</sup> according to which 70% out of total 3.5 billion tonnes gross weight of freight handled in main European ports<sup>10</sup> were transported to or from ports outside the EU. Already prior to the analysis, it is clear that the importance of high-sea shipping is not reflected in official statistics. Addressing this challenge, this study aims at quantifying value and volume flows that are transported on high-sea vessels.

### Economic profile of the Swiss economy

In 2019, goods with a total value of CHF 312 billion were exported from Switzerland.<sup>3</sup> The value share of imports amounted to CHF 276 billion. Figure 2 shows the evolution of Switzerland's foreign trade between 2000 and 2019. Whereas the trade volumes have evolved almost constantly, trade value has increased dynamically.

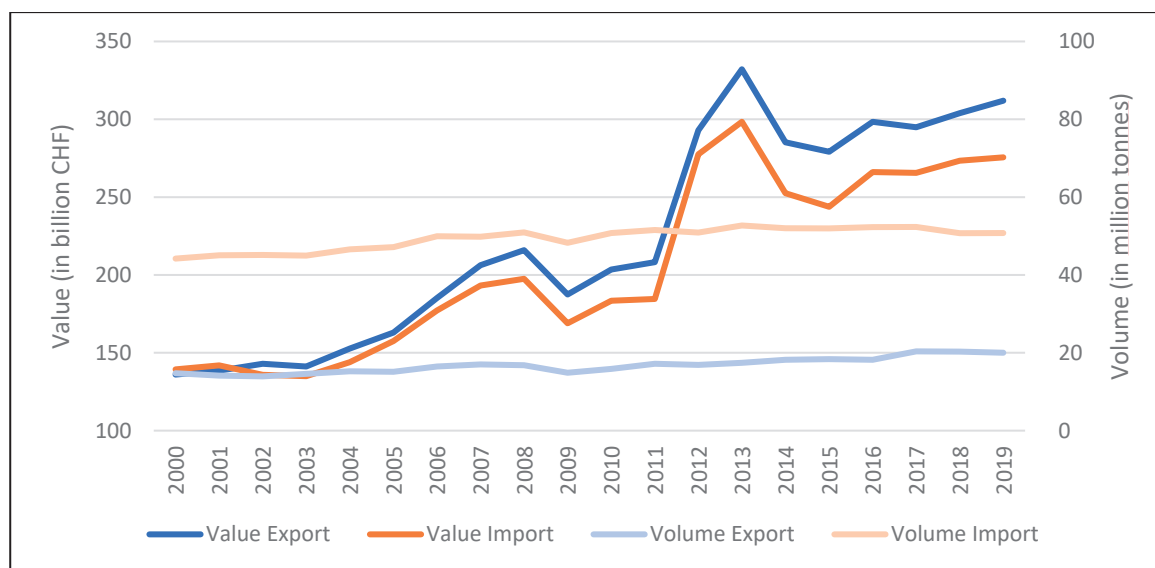


Figure 2: Development of Swiss imports and exports between 2000 and 2019 by value and volume.<sup>3</sup>

Commodities: Out of the total Swiss exports worth in 2019, chemical-pharmaceutical products (37%) are the most important commodity, followed by metals and derivatives incl. precious metals (mainly gold) (22%) and machinery and electronics (10%). Imports are dominated by metals and derivatives

<sup>9</sup> Eurostat (2020). Maritime ports freight and passenger statistics.

<sup>10</sup> Main port defined as handling >1mio tonnes annually

incl. precious metals (25%), followed by chemical-pharmaceutical products (19%) as second most important commodity and machinery and electronics (12%) ranked 3rd.

Table 1. European and intercontinental shares in Swiss foreign trade in the year 2019.<sup>3</sup>

	Volume (in mio. t)		Value (in bn. CHF)	
	Import	Export	Import	Export
Total trade	50.82	20.03	276.06	311.98
European	44.75	17.53	164.65	156.91
European in %	88.1%	87.5%	59.6%	50.3%
Intercontinental <sup>11</sup>	6.07	2.51	111.40	155.06
Intercontinental in %	11.9%	12.5%	40.4%	49.7%

Table 1 splits the Swiss total foreign trade dichotomously in European and intercontinental trade. It shows that by volume European countries account by far for the highest share of trading partners. By volume, intercontinental trading partners represent 11.9% of imports and 12.5% of exports. However, the picture evolves differently for the value share as the intercontinental share increases to 40.4% of imports and 49.7% of exports. Intercontinental trading partners are therefore of crucial importance for the development of the Swiss economy.

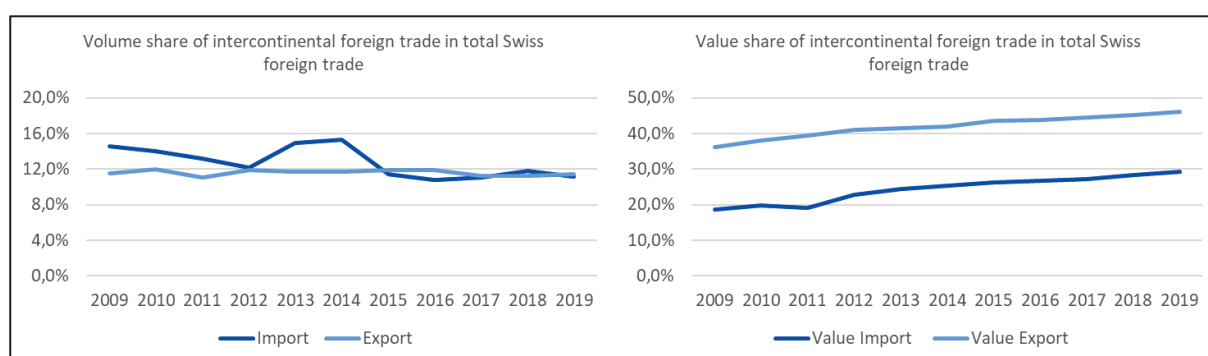


Figure 3. Evolution of volume and value share of Swiss intercontinental foreign trade.

A view on the evolution of Switzerland's intercontinental foreign trade reveals a decoupling of value and volume flows (see Figure 3). On one hand, the value share of intercontinental trade as percentage of total foreign trade has steadily increased over the last decade indicating an increasing relevance of trading partners outside Europe. On the other hand, volume shares have remained stable for exports and decreased for imports. Between 2009 and 2019, intercontinental imports decreased by 2%, intercontinental exports rose by 3%. This evolution is in line with total trade development showing that total imports marginally increased by 5% since 2009, total exports, however, increased by 35%.<sup>3</sup>

<sup>11</sup> Note: Russia and Turkey are excluded from "European" and only assigned to "Intercontinental", as the majority of the territory of both countries is outside Europe.

## 2. International trade flows from a Swiss perspective

Swiss customs data illustrate an accurate picture of transport modes used at border crossing. However, when considering the entire supply chain, a variety of modes of transports might be used to transport goods. Imports from North and South America that are recorded as rail or truck must have first reached Europe on the sea route, if not carried by air freight. Due to the methodological approach of the statistics, high-sea shipping is never recorded as foreign trade statistics capture the mode of transport at border crossing. On the basis of official data published, it is therefore not possible to estimate the importance of international high-sea shipping for the Swiss economy.

Table 2 shows Switzerland's most important intercontinental trading partners. When comparing them in terms of value and volume, significant differences become apparent, as well as between imports and exports.<sup>3</sup> Major export trading partners are mostly highly developed countries reflecting a strong demand for high quality Swiss products from these countries. On the import side, the picture blurs as the higher relevance of developing countries emphasises Switzerland's supply situation. High import volumes of developing countries demonstrate the big inbound share of raw materials (eg. crude oil from Nigeria), food and feedstuff (grains and cereals from Brazil) which are important for the national supply.

Table 2. Switzerland's top intercontinental trading partners in import and export, by volume and value.<sup>3</sup>

Rank	Volume (in t)		Value (in billion CHF)	
	Import	Export	Import	Export
1	Nigeria (935,530)	USA (663,334)	China (14,893)	USA (41,989)
2	China (872,771)	China (294,819)	USA (13,737)	China (13,392)
3	Kazakhstan (790,064)	UAE (158,264)	UAE (14,893)	Japan (8,080)
4	Libya (610,072)	Canada (113,081)	Japan (7,728)	Hong Kong (5,524)
5	USA (572,004)	Japan (98,320)	Vietnam (2,848)	Singapore (4,962)
6	Brazil (185,129)	India (85,292)	Singapore (2,168)	Canada (3,953)
7	India (169,683)	Singapore (663,334)	India (1,960)	South Korea (3,432)
8	Japan (134,426)	Brazil (61,325)	Hong Kong (1,296)	UAE (2,830)
9	Algeria (89,436)	Libya (52,832)	Taiwan (1,252)	Australia (2,568)
10	Canada (73,881)	Thailand (49,179)	Thailand (1,045)	Brazil (2,512)

The importance of maritime shipping only becomes clear when analysing the supply chains of certain goods end to end. The following are relevant Swiss supply chain examples that illustrate the complexity of global trade flows.

### Exemplary inbound and outbound supply chains

Switzerland is one of the largest coffee nations in the world, both as a trading hub for coffee as well as for the processing of coffee beans. Around Lake Geneva, the largest coffee traders worldwide have their corporate headquarters. Almost 190,000 tonnes were imported to Switzerland in 2019, almost exclusively from intercontinental origin. The largest importing countries comprise Brazil, Colombia and Vietnam. For the main (intercontinental) transport, only high-sea vessels are of relevance for this type

of commodity. Figure 4 illustrates schematically the inbound trade flow to Switzerland. After arriving in a European port, for example Hamburg, containers are transhipped and imported by train or truck.

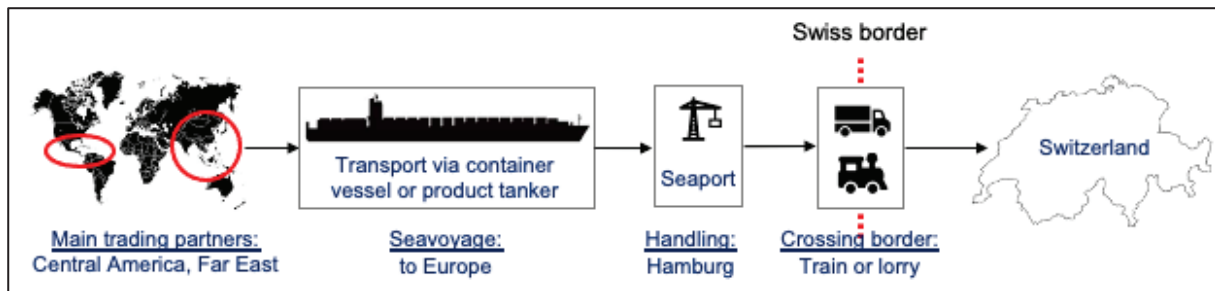


Figure 4: Exemplary inbound supply chain representation - coffee and coffee beans.

The discrepancy between Swiss customs statistics and actual trade lanes becomes even more apparent when looking at the import supply chain of refined petroleum products, e.g. fuels for vehicles or aircraft as well as for the industry (see figure 5) which amounted to 7.8 million tonnes in 2019. According to foreign trade statistics, Germany, the Netherlands and Belgium are named as the main trading partners, although these countries do not have significant oil resources. In reality, products are for example imported from the Netherlands after being refined in a Dutch refinery. The actual origin of the petroleum is located in other countries, however. Relevant trading countries are in the Middle East, Africa and Russia. In every case, the crude oil is transported by tanker to a European seaport. Crude oil is then refined and afterwards imported to Switzerland. For finished processed petroleum products, the Rhine ships, which deliver their cargo directly from the large refineries to the Rhine in Basel, are the number one means of transport. Pipeline transports also cover a significant proportion, connecting the Mediterranean ports of Genoa and Marseille with Swiss refineries such as in Cressier.

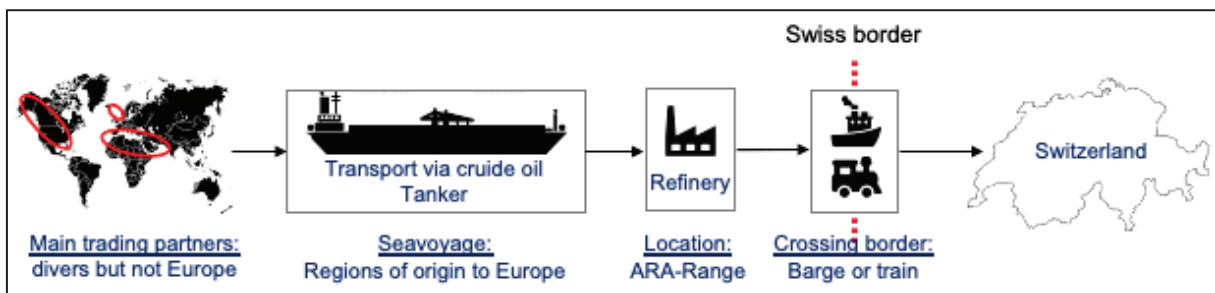


Figure 5: Exemplary inbound supply chain representation - refined petroleum.

When considering the outgoing flows of goods, maritime shipping cannot be ignored. In 2019, Switzerland exported almost 450,000 tonnes of industrial machinery (see Figure 6). Trading partners worldwide value the high-quality of Swiss industrial machinery and equipment. Accordingly, just under 35 % of those goods (by value), were exported to countries outside Europe. Due to the dimensions of the cargos, high-sea shipping is often the only viable way to transport the machinery internationally. Also, in this case, the associated transports upstream and downstream can vary, but in almost every case the high-sea vessel cannot be replaced.

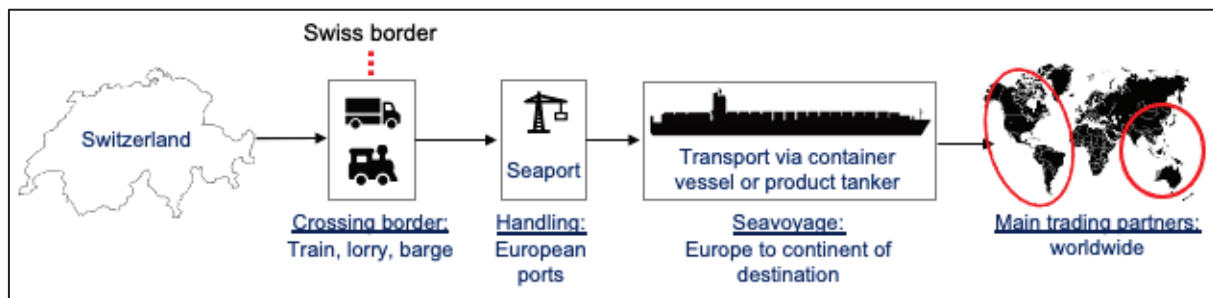


Figure 6: Exemplary outbound supply chain representation - industrial machinery.

### High-sea shipping convinces with loading capacity

With few exceptions, only aircraft and seagoing vessels can be used as a mode of transport for intercontinental trade. However, specific advantages of both modes differ widely. While air cargo shows a strong transport affinity for time-sensitive, high-value goods, the advantages of sea freight include low transport costs and high performance for volume goods. Even if air freight-affine goods, for example high-value electronics, are occasionally transported in consolidated containers, air and sea freight are not to be seen as substitutes and cannot be replaced by each other.

Asia can be reached by rail on the new Silk Road, and transports in both directions of sea freight can apparently be substituted. In 2018, 345,000 standard containers were transported on the new Silk Road between Europe and China.<sup>12</sup> At the same time,

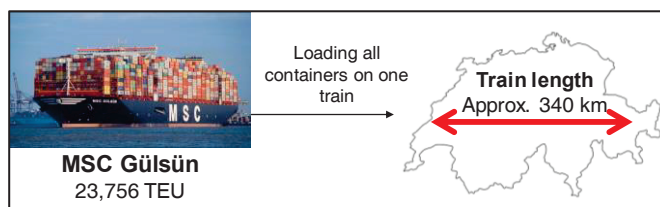


Figure 7. Shifting a container vessel on a single train.

almost 46 million containers were handled in the European North Sea ports. Although 640,000 containers are expected to be transported on the Silk Road by 2027, this share will only represent 1.5 % of the total container trade between Europe and Asia.<sup>12</sup> If all the containers from a huge container vessel (MSC Gülsün: 23,756 TEU) were lined up on a single train, the length of the train would reach more than 340 km (see Figure 7).<sup>13</sup> This example illustrates the performance of high-sea vessels for the transport of large volumes. Capacity on the new Silk Road will not be able to replace maritime freight in the foreseeable future. Thus, maritime transport will remain the backbone of European-Asian trade.

## 3. Estimation of the relevance of high-sea shipping for Switzerland

The data analysis phase of existing sources targeted at the study goal aims at providing comprehensive, resilient results for an objective assessment of the influence and dependency of the Swiss economy on high-sea shipping.

<sup>12</sup> Roland Berger (2018). Eurasian rail corridors

<sup>13</sup> European Commission (2020). European seaports 2030: upcoming challenges; MSC (2021) MSC Gülsün fact sheet.

### 3.1 Methodologic approach

In order to reach the study objective, the analysis stage followed the methodological approach of triangulation. Triangulation<sup>14</sup> is as a research strategy in which (1) different kinds of data are used to investigate a phenomenon in order to (2) use commonly the strengths of several approaches. The aim of the methodology is to achieve higher validity of research findings and reduce systematic errors.

#### Review criteria and quality standards of sources

For the purpose of triangulating key findings, the compilation of a "longlist" of sources provided the foundation for the initial review and evaluation of existing studies. The analysis focused on the use of publicly available sources only. Furthermore, the analysis targeted the study objective only for which a full analysis of all studies was not intended. In order to structure the review process, a catalogue of criteria was defined prior the literature review (see figure Figure 8).







 Publisher / author / client	 Methodology
 Topicality / year of publication	 Influencing factors / premises
 Time period under consideration	 Limitations

Figure 8. Overview of criteria used to evaluate existing sources in the analysis.

Additionally, in order to take into account that the validity of the selected sources varies, quality standards were defined to help focusing on highly valid and credible sources only. Definitions of the three derived quality standards A, B and C are illustrated in Figure 9. The analysis in this study comprises quality standards A and B only.

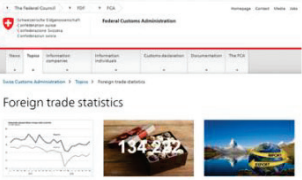


<p><b>Quality standard A</b></p> <p>Official data published by authorities and federal offices</p> <ul style="list-style-type: none"> <li>➤ Unrestricted compliance with central quality criteria validity, objectivity</li> </ul> <p><b>EZV/FCA:</b> Foreign trade statistics</p> 	<p><b>Quality standard B</b></p> <p>Data and studies by reputable institutions</p> <ul style="list-style-type: none"> <li>➤ High level of validity and objectivity</li> <li>➤ Underlying assumptions are reasonable and documented, findings are comprehensible.</li> </ul> <p><b>ISCM, IG Air Cargo:</b> Air Freight Logistics Study</p> 	<p><b>Quality standard C</b></p> <p>Data and studies published by private companies and associations</p> <ul style="list-style-type: none"> <li>➤ Partially data quality issues or limited transparency/traceability</li> <li>➤ Objectivity and thus also validity might be questionable</li> </ul> <p><b>DHL:</b> Ocean freight market update</p> 
--	---	--

Figure 9. Segmentation of data sources according to quality standards.

<sup>14</sup> Blaikie, N. (1991). A Critique of the Use of Triangulation in Social Research.

## From longlist to shortlist – deriving a study inventory for in-depth analysis

In a second step, a compressed study inventory was derived. The so called “shortlist” was further evaluated and used for the estimation of quantities and values of Switzerland’s maritime trade flows. In total, of all sources scanned, 31 were reviewed, of which 16 were allocated to the shortlist. The remaining 15 sources were put on the longlist. Those were excluded from the analysis within the triangulation as they only offer restricted added value for the study objective. Sources on the longlist were afterwards partly used to compare and contrast key findings and to highlight global market trends and developments not primarily linked to the Swiss market.

All 19 studies on the shortlist were then reviewed in detail following a two-step approach illustrated in Figure 10. Firstly, key features of each source were documented. This step comprised documenting authorship, publisher, method, content as well as limitations of the source. Secondly, it was documented how and which data and findings of each source were used. Besides reporting quality standard, method, the targeted parameters and results of the source, the following characteristics were documented if findings were further processed to estimate or extrapolate data: Underlying assumptions, step by step procedure of data processing as well as limitations of the approach.

Data origin						
Number	Title	Authorship	Publisher	Method	Content	Limitations
Document allocation	Source name (link to source)	Name of the authors	Name of the publisher	Methodological approach of the authors study	Intended outcome and content of study	Limitations of the source
I	<a href="#">Air Freight Logistics Study 2020</a>	Häberle, Stölzle (2020) - Institute of Supply Chain Management HSG	IG Air Cargo Switzerland	Mixed methods approach: quantitative and qualitative market analysis of the air freight industry focusing on the Swiss market	performance of the (Swiss) air freight logistics markets analysed in a European comparison perspective focusing on the following topics: air freight logistics market, climate, digitalisation, customer requirements, regulatory & COVID-19	sea freight analysed subordinatedly for comparative purposes in relation to air freight

**1. Data origin**

- Documentation of key features
- Characterisation of main sources

**2. Data usage and processing**

- Documentation of of procedure and derived results

Data usage and processing						
Quality standard	Method	Target parameters	Assumptions	Procedure	Limitations	Results
consistent with classification in the or comparison study inventory	Estimate, modelling parameters in scope	Value and tonnage share of sea freight in Swiss intercontinental foreign trade	Assumptions made that are necessary for determining the result	Methodological procedure for determining the results	Limitations of the determination of results	Concrete results of data usage and evaluation
B	Estimate purely based on EZV data	Value and tonnage share of sea freight in Swiss intercontinental foreign trade	1. road and rail as modes of transports are neglectable for intercontinental transport as only sea and air freight are used 2. Intercontinental imports and exports that are not transported via air freight are treated as seafreight	1. Extraction of intercontinental trade traffic out of total modes of transport other than air freight is calculated as sea freight. foreign trade for both exports and imports differentiated by tonnage (ca. 11% of both exports and imports) and value (40% of imports, 50% of exports) 2. As air and sea are the only possible modes of transport, exclusion of air freight share (tonnage share very low with only 1% of imports and 5% of exports, value share varying between 68% for intercontinental imports and 82% for exports 3. Remaining share is fully attributed to the maritime sector	Limitations of the determination of results However, in few markets other modes of transport are used as well (small share of trucking to Northern Africa, rail to China) -> neglectable share	Sea freight tonnage share in intercontinental... - imports: 98,9% - exports: 94,8%  Sea freight value share in intercontinental... - imports: 32,1% - exports: 18,4%

Figure 10. Two-step approach for a comprehensive and transparent documentation of reviewed sources.

## Expert interviews as key element of the validation process

Derived preliminary findings were validated by conducting expert interviews and comparing findings to other markets. The selection of experts targeted at including multiple perspectives to cover and critically assess derived findings and estimations. In total 5 experts were interviewed representing the following four logistics backgrounds:

- Sea freight – global
- Rail – Switzerland and global
- Shipper association – Switzerland
- Port – Switzerland and Europe