

# SDG indicator metadata

(Harmonized metadata template - format version 1.1)

## 0. Indicator information (SDG\_INDICATOR\_INFO)

### 0.a. Goal (SDG\_GOAL)

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

### 0.b. Target (SDG\_TARGET)

Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

### 0.c. Indicator (SDG\_INDICATOR)

Indicator 9.1.2: Passenger and freight volumes, by mode of transport

### 0.d. Series (SDG\_SERIES\_DESCR)

IS\_RDP\_FRGVOL - Freight volume (tonne kilometres) [9.1.2]

IS\_RDP\_LULFRG - Freight loaded and unloaded (metric tons) [9.1.2]

IS\_RDP\_PFVOL - Passenger volume (passenger kilometres) [9.1.2]

IS\_RDP\_PORFVOL - Container port traffic (twenty-foot equivalent units - TEUs) [9.1.2]

### 0.e. Metadata update (META\_LAST\_UPDATE)

2024-05-24

### 0.f. Related indicators (SDG\_RELATED\_INDICATORS)

### 0.g. International organisations(s) responsible for global monitoring

(SDG\_CUSTODIAN\_AGENCIES)

International Civil Aviation Organization (ICAO); International Transport Forum (ITF); United Nations Conference on Trade and Development (UNCTAD).

## 1. Data reporter (CONTACT)

### 1.a. Organisation (CONTACT\_ORGANISATION)

International Civil Aviation Organization (ICAO); International Transport Forum (ITF); United Nations Conference on Trade and Development (UNCTAD).

## 2. Definition, concepts, and classifications (IND\_DEF\_CON\_CLASS)

### 2.a. Definition and concepts (STAT\_CONC\_DEF)

#### Definitions:

Passenger volumes are measured in passenger-kilometres while freight volumes are measured in tonne-kilometres, and broken down by mode of transport. For the purposes of monitoring this indicator, passenger-km data are split between aviation, road (broken down between passenger cars, buses and motorcycles) and rail, and tonne-km are split between aviation, road, rail and inland waterways.

Maritime freight is measured in metric tons and container port traffic is measured in twenty-foot equivalent unit (TEU).

**Concepts:**

*Aviation:*

The International Civil Aviation Organization (ICAO) through its Statistics Division has established standard methodologies and definitions to collect and report traffic (passenger and freight volume) data related to air transport. These standards and methodologies have been adopted by the 193 Member States of ICAO and also by the Industry stakeholders i.e. air carriers and airports. The data of ICAO is used by States and also the World Bank for its development indicators. ICAO uses Air Transport Reporting Forms A, AS, B and C to arrive at the passenger and freight volumes for air transport. The aviation data reported under indicator 9.1.2 is for scheduled traffic.

Precise definition of all different concepts and metadata related to Air Transport Reporting Forms A, AS, B and C to arrive at the passenger and freight volumes for air transport, as approved by the ICAO Statistics Division and Member States can be found at the ICAO website given below -

<http://www.icao.int/sustainability/pages/eap-sta-excel.aspx/>.

*Maritime*

**Definitions:**

International maritime freight is an indicator reflecting (1) the sum of international freight volumes loaded (exports) and unloaded (imports) at ports worldwide and measured in metric tonnes, and (2) container port traffic at world ports measured in twenty-foot equivalent unit (TEU).

Data is collected by the UNCTAD secretariat from various sources, including industry, government and specialised maritime transport data providers and consultancies. Volumes are expressed in metric tonnes and twenty-foot equivalent unit (TEU).

As data on international maritime freight volumes are not widely available, only the data in tonnes (rather than tonne-km) and at the regional level are reported.

Data at country level are available for container port traffic measured in twenty-foot equivalent unit (TEU).

**Concepts:**

The UNCTAD secretariat collects and compiles the data from various websites and reports, including, by port and industry associations and authorities, national statistics offices, UN Monthly Bulletin of Statistics, governments, specialised agencies such as the International Energy Agency (IEA), the US Energy Information Administration (EIA), the Organization of the Petroleum Exporting Countries (OPEC), and British Petroleum (BP). Data is also collected from reports issued by maritime specialised sources such as Drewry Maritime Research (DMR), Clarksons Research Services (CRS), Dynamar, and Lloyd's List Intelligence (LLI).

*Road, Rail, Inland waterways*

For definitions of all relevant terms, the UNECE/ITF/Eurostat Glossary for Transport Statistics can be consulted. The 5<sup>th</sup> edition of this publication is available at

[https://unece.org/DAM/trans/main/wp6/pdfdocs/Glossary\\_for\\_Transport\\_Statistics\\_EN.pdf](https://unece.org/DAM/trans/main/wp6/pdfdocs/Glossary_for_Transport_Statistics_EN.pdf)

## 2.b. Unit of measure (UNIT\_MEASURE)

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Aviation: Revenue Passenger-Kilometres (RPK) and Freight Tonne-Kilometres (FTK)

Maritime: Metric tonnes and twenty-foot equivalent unit (TEU).

Road, Rail:

Passenger-Kilometres (Pkm) and Tonne-Kilometres (Tkm)

*Inland Waterways*: Tonne-Kilometres (Tkm)

## 2.c. Classifications (CLASS\_SYSTEM)

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*Maritime*:

Regional and sub-regional level data based on UNSD classification.

## 3. Data source type and data collection method (SRC\_TYPE\_COLL\_METHOD)

### 3.a. Data sources (SOURCE\_TYPE)

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*Aviation*

ICAO Air Transport Reporting Forms approved by the Statistics Division of ICAO and its Member States has been used to define standards, methodologies and to collect aviation data since the 1950's. ICAO definitions and metadata is also used by the Aviation Industry as the basis of collecting data and conducting analysis.

*Maritime*:

The UNCTAD secretariat collects and compiles the data from various websites and reports, including, by port and industry associations and authorities, national statistics offices, UN Monthly Bulletin of Statistics, governments, specialised agencies such as the International Energy Agency (IEA), the US Energy Information Administration (EIA), the Organization of the Petroleum Exporting Countries (OPEC), and, British Petroleum (BP). Data is also collected from reports issued by maritime specialised sources such as Drewry Maritime Research (DMR), Clarksons Research Services (CRS), Dynamar, and Lloyd's List Intelligence (LLI).

*Road, Rail, Inland waterways*:

The ITF runs transport models that are used to provide transport information for all regions.

### 3.b. Data collection method (COLL\_METHOD)

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*Aviation*:

Official aviation statistics are reported on a regular basis by Member States to ICAO through Air Transport Reporting Forms.

*Maritime*:

Data are not based on a systematic reporting by countries and relies mainly on secondary sources that may vary over time. Official reporting by countries is very limited. Data for freight loaded and unloaded in metric tons are only available at regional or sub-regional level.

The UNCTAD secretariat is currently collaborating with a specialized data provider and UN-DESA to elaborate a standard methodology that is based on UN Comtrade data to generate annual data on maritime freight flows, at country level and for all UN member countries.

Note: Data on international maritime freight excludes transshipments and domestic maritime freight volumes.

*Road, Rail, Inland waterways:*

Data come from the ITF Global Models.

ITF (forthcoming), ITF Transport Outlook 2023, OECD Publishing, Paris

### 3.c. Data collection calendar (FREQ\_COLL)

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*Aviation:*

Every year by the fall data for the previous year is available to ICAO Member States at a country level.

*Road/Rail/Inland waterways:*

There is no compilation of data submitted from the countries. Data comes from the ITF Global Models which are updated every two years. In the last iteration of the ITF Global Models, data are available for 2015, 2019, 2020 and 2022. 2021 data are an interpolation of 2020 and 2022 data.

ITF (forthcoming), ITF Transport Outlook 2023, OECD Publishing, Paris

### 3.d. Data release calendar (REL\_CAL\_POLICY)

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*Aviation:*

Data are collected on a regular basis and a high level of coverage is expected to be available by the fall following the reference year.

*Maritime:*

Data are collected for the reference year on-ongoing process. Data are published annually on-line on UNCTADstat and in the annual Review of Maritime Transport in September of each year.

*Road, Rail, Inland waterways:*

Data come from the ITF Global Models which are updated every two years.

ITF (forthcoming), ITF Transport Outlook 2023, OECD Publishing, Paris

### 3.e. Data providers (DATA\_SOURCE)

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Name:

ICAO, ITF, UNCTAD

*Aviation :*

International Civil Aviation organisation (ICAO).

*Maritime:*

Name: United Nations Conference on Trade and Development (UNCTAD)

Description: Data collected by UNCTAD from various sources, including government, industry and specialized maritime data sources and providers.

*Road, Rail, Inland waterway:*

Data are from ITF Global Model estimation.

### 3.f. Data compilers (COMPILING\_ORG)

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International Civil Aviation organisation (ICAO)

International Transport Forum (ITF)

UN Trade and Development

### 3.g. Institutional mandate (INST\_MANDATE)

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ICAO:

ICAO is funded and directed by 193 national governments to support their diplomacy and cooperation in air transport as signatory states to the Chicago Convention (1944). Its core function is to maintain an administrative and expert bureaucracy (the ICAO Secretariat) supporting these diplomatic interactions, and to research new air transport policy and standardization innovations as directed and endorsed by governments through the ICAO Assembly, or by the ICAO Council which the assembly elects.

<https://www.icao.int/about-icao/Pages/default.aspx>

UNCTAD:

Established in 1964, the United Nations Conference on Trade and Development (UNCTAD), rebranded as UN Trade and Development since April 2024, published its annual Review of Maritime Transport for the first time in 1968. The publication is part of UNCTAD's research and analytical work in the field of maritime transport aimed at helping developing countries maximize their trade and investment opportunities and increase their participation in the world economy. It has been regularly reconfirmed in the quadrennial Ministerial Conferences, most recently by UNCTAD XIII in Doha (2012) and UNCTAD XIV in Nairobi (2016). The mandates emanating from these conferences have emphasized sustainable and resilient transport as priority action areas and established "Sustainable and Climate Resilient Maritime Transport" as an important thematic area in UNCTAD's work programme and the Review of Maritime Transport.

ITF:

The International Transport Forum (ITF) was created by Ministerial Declaration in Dublin in 2006 on the legal basis of the European Conference of Ministers of Transport (ECMT), itself established as an international organisation by treaty (Protocol) signed in Brussels on 17 October 1953. The objectives of the ITF are to serve as a global platform for discussion and prenegotiation of transport policy issues across all modes. Unique in its global and modal scope, the ITF works to foster a deeper understanding of the role of transport in economic growth, environmental sustainability and social inclusion. It aspires to raise the public profile of transport policy.

## 4. Other methodological considerations (OTHER\_METHOD)

### 4.a. Rationale (RATIONALE)

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Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and

equitable access for all. Trans-border infrastructure development is best captured by passenger and freight volumes moved by Member States and Regions. A growth in passenger and freight volumes shows a robust infrastructure development happening in States and Regions along with the resultant socio-economic benefit. Air Transport is particularly important not only for the economic and job benefits but also because it is one of the only mode of transport that can be relied on during emergencies and disease outbreaks to reach food, medicines, medical personnel, vaccines and other supplies speedily to the affected persons in the affected areas. In addition, tracking how the non-road share of freight volumes, and the public transport share of passenger volumes, changes over time allows insights into the overall sustainability of the global transport system.

*Aviation:*

Informed decision-making is the foundation upon which successful businesses are built. In a fast-growing industry like aviation, planners and investors require the most comprehensive, up-to-date, and reliable data. ICAO's aviation data/statistics programme is to provide accurate, reliable and consistent aviation data so that States, international organizations, aviation industry, tourism and other stakeholders can make better projections. The UN recognized ICAO as the central agency responsible for the collection, analysis, publication, standardization, improvement and dissemination of statistics pertaining to civil aviation.

*Maritime:*

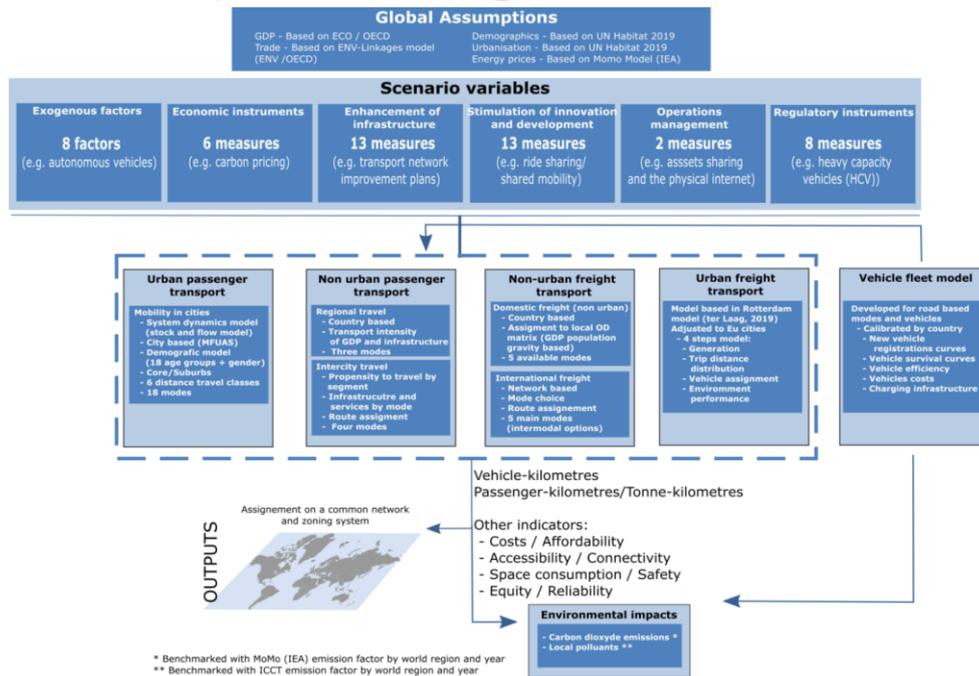
The volume of international maritime freight and container port traffic movements provide an overall indication of the importance of port infrastructure for trade and development and may be relied upon to infer the quality and adequacy of seaports and their hinterland connections. Maritime transport is the dominant mode of international freight transport when flows are measured in volume terms. Behind the global and regional headline estimates, individual contributions vary by region and type of cargo, reflecting, among other factors, differences in countries' economic structures, composition of trade, urbanization, levels of development, extent of integration into global trading networks, degree of participation in global supply chains, and the quality of transport infrastructure.

World container port traffic reflects the importance of containerized trade and countries' participation in global liner shipping networks and globalized manufacturing production processes.

*Road, Rail, Inland waterways:*

The International Transport Forum has developed a set of modelling tools to build its own forward-looking scenarios of transport activity. Covering all modes of transport, freight and passenger, the tools are unified under a single framework.

# Modelling framework



For passenger volumes, the following models are used to generate the data: the urban passenger transport model and the non-urban passenger transport model.

The urban passenger transport model is a strategic tool to test the impacts of policies and technology trends on urban travel demand, related CO2 emissions and accessibility indicators.

The non-urban passenger transport model is a strategic tool that tests the impacts of multiple policies and trends on the non-urban passenger sector.

For freight volumes, the non-urban freight transport model is used to generate the data. The non-urban freight transport model assesses and provides scenario forecasts for freight flows around the globe. It is a network model that assigns freight flows of all major transport modes to specific routes, modes, and network links.

The ITF Modelling Framework is available at [The ITF Modelling Framework](#).

## 4.b. Comment and limitations (REC\_USE\_LIM)

### Aviation:

Coverage for aviation is for all ICAO 193 Member States.

### Maritime:

Freight loaded and unloaded, maritime transport: Coverage only at regional and sub-regional level.

Container port traffic, maritime transport: Coverage at regional, sub-regional and member state level.

Totals may conceal the fact that some minor ports are not included. The data includes container port throughput for ports with time series that are complete since 2010 or that can be made complete by repeating an observation for a maximum of three years after the original observation. This means that on country level time series are comparable over time but that the coverage of ports may differ between countries.

### Road, Rail, Inland waterways:

Coverage at regional and sub-regional level.

#### 4.c. Method of computation (DATA\_COMP)

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##### *Aviation*

The aviation passenger and freight volumes are reported for the air carriers through ICAO Air Transport Reporting Forms and grouped by Member States of ICAO.

##### *Road/Rail/Inland waterways*

###### Urban passenger transport model

The model is designed as a systems dynamic model (stock and flow model) to evaluate the development of urban mobility in all cities over 50 000 inhabitants around the world. It combines data from various sources that form one of the most extensive databases on global city mobility to account for fifteen transport modes. These range from the conventional private car and public transport to new alternative modes such as shared mobility.

###### Non-urban passenger transport model

The model provides scenario forecasts for non-urban transport activity and its related CO2 emissions up to 2050. The model estimates activity between urban areas (intercity travel) and passenger activity happening locally in non-urban areas (intra-regional travel). The latter includes travel in peri-urban and rural areas. The model is developed to assess the impact of transport, economic and environmental policy measures (air liberalisation, carbon pricing, etc.), as well as the impact of technological developments and breakthroughs (electric aviation, autonomous vehicles, etc.).

###### Non-urban freight transport model

The most recent version of the ITF freight model integrates the (previously distinct) surface and international freight models. International and domestic freight flows are calibrated on data on national freight transport activity (in tonnes-kilometres, tkm) as reported by ITF member countries. Reported data is also used to validate the route assignment of freight flows. Trade projections in value terms stem from the OECD trade model and converted into cargo weight (tonnes). These weight movements are then assigned to an intermodal freight network that develops over time in line with scenario settings. These define infrastructure availability, available services and related costs.

The model uses 2015 as its baseline year and provides estimation values for 2015, 2019, 2020, 2022, and 2025, then with computations done in five-year intervals. Therefore, the data for 2021 is derived through interpolation of the simulated values for 2020 and 2022.

The ITF Modelling Framework is available at [The ITF Modelling Framework](#).

##### *Maritime:*

The indicator is calculated through a sum of international maritime freight volumes and container port traffic as collected by UNCTAD secretariat from websites and reports by various industry, government and specialised maritime transport data providers and consultancies. Data on international maritime freight excludes transshipments and domestic maritime freight volumes.

Cargo flows originating in or destined to landlocked countries are attributed to the ports of neighbouring coastal transit countries. The mode of transport “maritime” is assigned to an international trade transaction when the goods arrived at the country’s external border (the seaport) transported by ship.

Data on container port traffic include full and empty containers as well as transshipment traffic.

Data is collected and compiled from various websites and reports, including, by port and industry associations and authorities, national statistics offices, UN Monthly Bulletin of Statistics, governments, specialised agencies such as the International Energy Agency (IEA), the US Energy Information Administration (EIA), the Organization of the Petroleum Exporting Countries (OPEC), and British Petroleum (BP). Data is also collected from reports issued by maritime specialised sources such as Drewry Maritime Research (DMR), Clarksons Research Services (CRS), Dynamar, and Lloyd's List Intelligence (LLI).

#### 4.d. Validation (DATA\_VALIDATION)

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##### *Aviation:*

ICAO Statistics Programme has put in place a series of robust data quality control functions to automate all the necessary calculations and producing a report for each reporting form. These quality control processes were divided into two main activities: verification and validation.

##### *Maritime:*

UNCTAD secretariat monitors, collects, and compiles the data at the country level as well as at regional/sub-regional level. It continuously updates the data as new data and information becomes available. Some commercial providers of maritime statistics publish global data that is derived, for example, from shipping contracts, and UNCTAD compares its own data with those published by commercial providers.

##### *Road/Rail/Inland waterways:*

There is no compilation of data submitted from the countries. Data comes from the ITF Global Models. ITF (forthcoming), ITF Transport Outlook 2023, OECD Publishing, Paris

#### 4.e. Adjustments (ADJUSTMENT)

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Road, rail, inland waterways:

In order to provide a worldwide regional coverage, data from the ITF transport models are used (see point 4.f).

#### 4.f. Treatment of missing values (i) at country level and (ii) at regional level

(IMPUTATION)

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- **At country level**

Aviation data are broadly complete.

For inland transport statistics: In case of missing data for a country for which at least one data point is available since 2000, we calculate estimates based on the expected growth rate for the country. The growth rates are computed from other socio-economic variables, such as Gross Domestic Product (GDP), population or urbanization.

For road, rail, and inland waterways:

Not applicable

*Maritime:*

International maritime freight: In case of missing data for a country or a sub-region for which a data point is available since 2006, UNCTAD makes an estimate based on the expected growth rate of the volume of merchandise trade. If not available, use is made of the latest year for which data was available.

Container port traffic: The data includes container port throughput for ports with time series that are complete since 2010 or that can be made complete by repeating an observation for a maximum of three years after the original observation. Repeated port level observations are treated as estimates and country level figures that are made up of more than 40 per cent estimates are not published but included in the group level totals. UNCTAD continuously seeks to improve coverage in updates to this table. Ports included are noted in the economy level notes for data on <https://unctadstat.unctad.org/datacentre/dataviewer/US.ContPortThroughput>.

#### 4.g. Regional aggregations (REG\_AGG)

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Aggregation by region based on UN classification of country groupings, including by geography and development status.

Road/Rail/Inland waterways: The model estimations are at a country level but the analysis is only possible at the regional groupings using simple summation from country level.

#### 4.h. Methods and guidance available to countries for the compilation of the data at the national level (DOC\_METHOD)

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Aviation:

States refer to the ICAO Reference Manual on the Statistics Programme (Doc 9060) to compile and file traffic reports at a national level.

Road/Rail/Inland waterways

ITF only provides model results to be public at the regional level.

*Maritime:*

Countries do not systematically collect or report data on international maritime freight and container port traffic. UNCTAD relies on data published by industry and information published by specialized sources.

#### 4.i. Quality management (QUALITY\_MGMNT)

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*Aviation:*

ICAO applies the recommendations of the Committee for the Coordination of Statistical Activities (CCSA), including the Principles Governing International Statistical Activities.

*Maritime:*

UNCTAD statistics are compiled and disseminated in accordance with the Principles Governing International Statistical Activities published by the Committee for the Coordination of Statistical Activities ([https://unstats.un.org/unsd/ccsa/principles\\_stat\\_activities/](https://unstats.un.org/unsd/ccsa/principles_stat_activities/)) and in line with the UNCTAD Statistics Quality Assurance Framework (<https://unctad.org/publication/statistics-quality-assurance-framework>).

### *Road/Rail/Inland waterways*

This is not a statistical product resulting of data collection. Data are generated from a modelling exercise. ITF (forthcoming), ITF Transport Outlook 2023, OECD Publishing, Paris

## 4.j Quality assurance (QUALITY\_ASSURE)

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### *Aviation:*

ICAO applies the United Nations Statistics Division (UNSD) fundamental principles and good practices of official statistics, and particularly the generic national quality assurance framework (NQAF). The complete version of the guidelines of NQAF is available at:

<http://unstats.un.org/unsd/dnss/qualityNQAF/nqaf.aspx>.

### *Maritime:*

UNCTAD conducts annual checks of collected data by updating the data with latest data available and comparing the data for internal consistency, against previous years, or similar data published or produced by other sources, including commercial sources specialized maritime transport data providers and research entities. Correspondence is undertaken with countries when necessary to collect, compare or confirm relevant data.

### *Road/Rail/Inland waterways:*

Not Applicable

## 4.k Quality assessment (QUALITY\_ASSMNT)

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## 5. Data availability and disaggregation (COVERAGE)

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### **Data availability:**

#### *Aviation*

Data already provided for all 193 Member States that have air transport activities

#### *Road/Rail/Inland waterways*

2015,2019,2020,2021

### **Time series:**

#### *Aviation*

From 1970's

#### *Road/Rail/Inland waterways*

2015,2019,2020,2021

### **Disaggregation:**

### *Aviation*

The indicator can be dis-aggregated by -Country, Country pair, City Pair, Region, Segment (International and domestic)

### *Road/Rail/Inland waterways*

The indicator can be disaggregated by mode of transport.

### *Maritime:*

**Data availability:** International maritime freight data at regional and sub-regional level annually from 2006.

Container port traffic data annually from 2010.

**Disaggregation:** International maritime freight: global, regional and subregional levels.

Container port traffic: global, regional and country levels

## 6. Comparability / deviation from international standards (COMPARABILITY)

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### *Maritime:*

#### **Sources of discrepancies:**

Data based on varied and mixed sources. This entails differences in computational systems and methods which may result in discrepancies.

## 7. References and Documentation (OTHER\_DOC)

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### **URL:**

[www.icao.int](http://www.icao.int)

<https://www.itf-oecd.org/itf-modelling-framework-1>

<https://w3.unece.org/PXWeb/en>

<https://unctadstat.unctad.org/EN/>

UNCTAD. Review of Maritime Transport Series: <https://unctad.org/topic/transport-and-trade-logistics/review-of-maritime-transport>

UNCTADstat:

Seaborne Trade: <https://unctadstat.unctad.org/datacentre/dataviewer/US.SeaborneTrade>

Container Port Throughput:

<https://unctadstat.unctad.org/datacentre/dataviewer/US.ContPortThroughput>