

# Transport System Resilience



**What is transport  
system resilience?**

**How do different  
transport network  
types respond  
to disruption?**

**What can policy  
makers do to make  
transport systems  
more resilient?**

## **At a glance**

The transport sector currently faces a number of disruptions related to geopolitics, climate change and energy security. Transport system resilience refers to the sector's capacity to deal with, adapt to and recover from such disruptions.

Increased interconnections within transport systems exacerbate their growing exposure to "poly-crisis". This is also the case for links between the transport sector and other systems: disruptions related to energy, pandemics, cyber-attacks or supply chains can easily cascade to transport systems and across regions.

The severity of disruptions depends on the characteristics of the affected networks. Hub-and-spoke networks, for instance, are more vulnerable to cascading disruptions than less centralised systems.

In the case of container shipping, regional crises can quickly spill over to other regions: the Red Sea navigation crisis of 2023-24 disrupted shipping not only between Asia and Europe but also between Asia and North America, even though ships on this route do not transit the Red Sea

Huge uncertainty exists about where disruptions might occur in future. And despite progress in risk assessment, few governments currently use existing tools – including horizon scanning, vulnerability analysis of network characteristics, digital twins, and transport modelling – to identify potential risks.

Policies to make transport systems more resilient need to define the balance between mitigation and adaptation measures. Which measures make most sense differs across transport systems and also depends on the characteristics of individual transport networks.

Figure 5

## Crisis in the Red Sea

Ships transiting the Bab-el-Mandeb Strait, November 2023 to March 2024

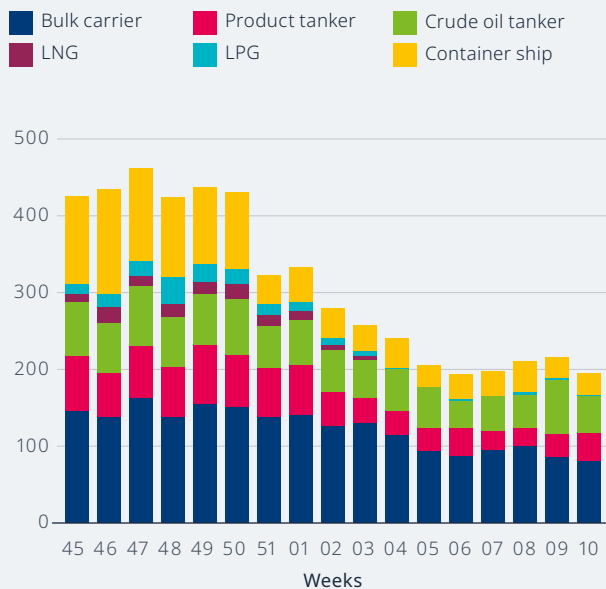
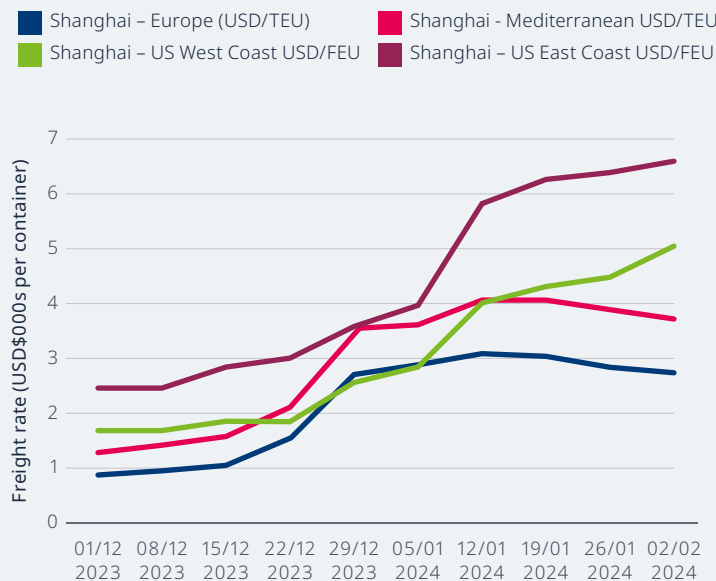


Figure 3

## The cost of disruptions in container shipping

Container freight rates on selected trade routes



## Incorporate resilience into national and multilateral transport policies and planning

Resilience should be a core objective of transport policy. Resilient transport systems continue to function or recover quickly in case of disruptions, minimising the cost to society and the economy.

Inoculating transport systems against breakdowns requires making the notion of resilience an integral part of transport policies, strategic planning, infrastructure appraisal, competition policies, and transport-related indicators

In the case of global disruptions, national governments are limited in their ability to act alone effectively. Multilateral co-ordination offers huge opportunities for governments to learn from each other how to deal with disruptions.

## Create tools that help reduce uncertainty about future disruptions to transport systems

Analytical tools and indicators can help reduce uncertainty by detecting vulnerabilities in transport systems. Such tools should be employed by policies that aim to increase transport's resilience.

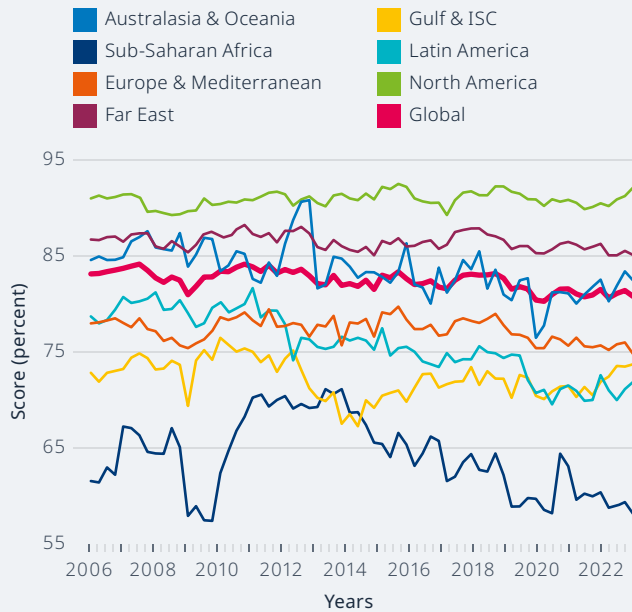
The effectiveness of such tools, and the policies they inform, in turn, depends on the coherence and consistency of the information gathered on transport system performance.

Policy makers should stimulate the development and deployment of methods such as horizon scanning, risk assessment and prediction of vulnerabilities via analysis of network characteristics, digital twins or transport modelling.

Figure 4

## An interconnected world

Maritime Trade Connectivity scores by world region, 2006-22, per quarter



## Develop guidance on when and how to apply resilience measures for transport systems

Guidance for policy makers on how to prepare for transport system disruptions should focus on best practices for robustness and recovery.

One important task involves elaborating the policy trade-off between proactive (mitigation) and reactive (adaptation) policies. Another is estimating costs of disruption, mitigation and adaptation in different circumstances. A third is deciding how to embed concepts such as redundancy and adaptability in transport decision making.

All of these actions can help determine the circumstances in which specific policy measures make most sense.



## Transport System Resilience ITF Roundtable Report

This report sets out the main disruptions to transport systems worldwide. It explores ways to reduce uncertainty by assessing vulnerabilities, and the main mitigation and adaptation measures required to ensure transport systems function in times of crisis.



**Available for download:**

[www.itf-oecd.org/transport-system-resilience](http://www.itf-oecd.org/transport-system-resilience)

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