

ABSTRACT

Moving oversized and heavy cargo (wind turbine components, transformers, and large modules) is central to global capital projects. Multipurpose vessels (MPVs) play an important role in transporting this specialized project cargo. While most studies focus on landside transport, critical risks also occur throughout waterside operations, from loading and transit to mooring and final discharge. A small error can cause serious damage, delays, and safety incidents, yet these operations often rely on fragmented practices. This poster presents four stages (port of loading, transit, mooring, and port of discharge), each with defined checks, responsibilities, and risk controls. The result is a practical, repeatable framework designed to improve safety, coordination, and efficiency throughout the waterside heavy-lift cargo cycle.

CHALLENGE

Heavy-lift waterside operations can concentrate some of the highest risks and potential consequences of the voyage:

Damage
Damage to berths, quay cranes, vessels, and high-value cargo

Delays
longer port stay, missed windows, and knock-on schedule costs

Safety
injuries to crew and mooring personnel, plus pollution risk

A small mistake can cause major losses

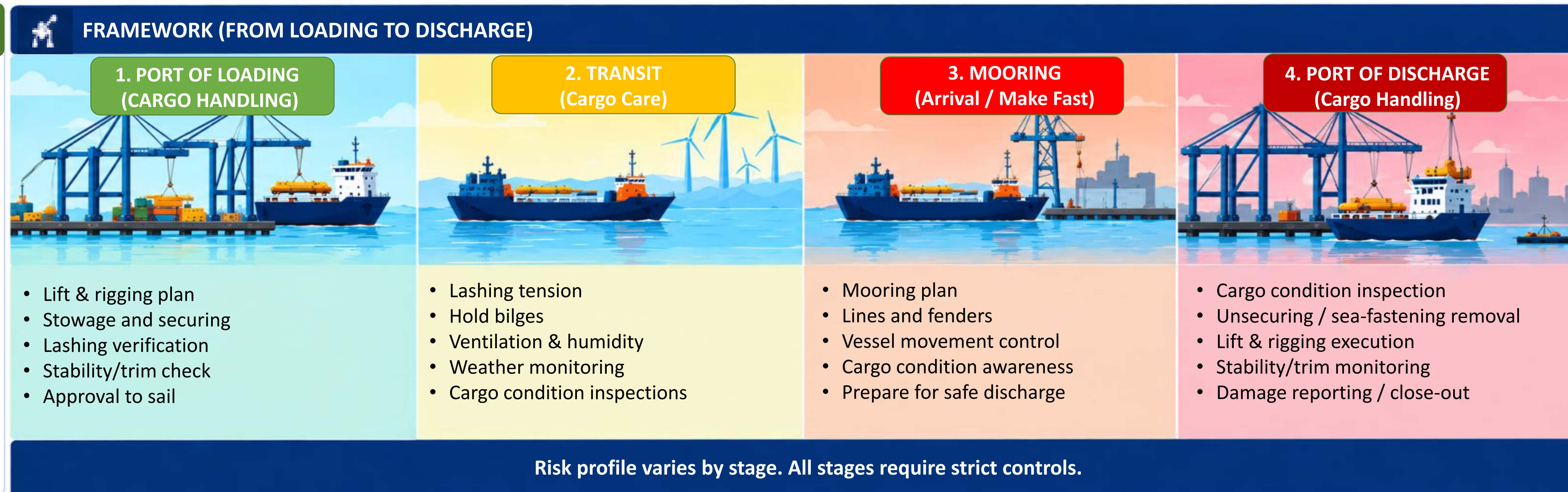
THE GAP WE ADDRESS

Existing guidance for heavy-lift operations is often fragmented, focusing separately on vessels, ports, and cargo. There is a lack of an integrated, practical framework that combines:

- Staged controls from loading to discharge
- Standardized checks for each stage
- Clear responsibilities for all stakeholders
- Risk mitigation measures tailored to heavy-lift cargo

Our framework bridges this gap with a simple, actionable approach.

- METHODOLOGY**
- Define the approach**
Review regulations, standards, and past incidents
 - Set stop-criteria**
Identify key actions, decision points, and stop-checks for each zone
 - Engineer the lift**
Use Failure Mode and Effects Analysis (FMEA) to connect risks with controls
 - Monitor in real time**
Evaluate performance and update the framework based on operational feedback



- KEY STAKEHOLDERS**
- Ship (On Board)**
 - Master (overall authority)
 - Chief Mate
 - Deck Officers and Crew
 - Terminal / Port**
 - Port Captain
 - Lifting Supervisor
 - Stevedores (Longshoremen)
 - Independent**
 - Marine Surveyor / MWS
 - Authorities**
 - Port State Control
 - Coordination**
 - Port / Vessel Agent

KEY RISK MANAGEMENT ELEMENTS

Cargo condition
Verify cargo condition and securing at each stage

Safe handoff
A clear go / no-go check before the next stage

Backup systems
Tugs, thrusters, spare lines and gear matched to risk level

Plan, share, check
A simple plan, shared with the team, and verified in real time

BENEFITS

Lower Risk
Safer vessels, ports, and personnel

Reduced port stay
More predictable schedules

Lower standby cost
Better resource utilization

Improved safety
Healthier people and environment

CONCLUSION

Heavy-lift risk extends across the waterside cargo cycle, from loading and transit through mooring and discharge. A staged framework with clear responsibilities, standardized checks, and stop-points creates a safer, more consistent, and repeatable approach to project cargo operations.

STAGED RISK MANAGEMENT FOR WATERSIDE HEAVY-LIFT OPERATIONS

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