

Decoding Ukraine's naval victories: A logic model approach

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Photo: Odin Vinje Kjendalen/Forsvaret

This article introduces the Black Sea Battle Lab (BBL) logic model, a framework designed to trace how Ukraine's operational responses to Russia's invasion link strategic pressures to measurable outcomes and broader doctrinal insights

Russia's illegal full-scale invasion of Ukraine has turned the Black Sea into a contested maritime domain, where securing Sea Lines of Communication (SLOCs) is essential ^[1] not only for enabling Ukraine's path to victory, but also for protecting global export routes and energy transit corridors ^[2]. Despite initial setbacks, Ukraine has demonstrated remarkable resolve and combat efficiency, most notably through the use of technology, decentralized command structures, and coalition building ^[3]. These efforts have challenged conventional military doctrines and reshaped strategic thinking on naval warfare.

To map the pathways and relationships that underpin these successes, the Black Sea Battle Lab (BBL) – a research team drawing on expertise from Ukrainian armed forces and Norwegian defense institutions, academia ^[4] – developed a logic model (see Figure 1) to

address key research questions, such as: How have Ukrainian operations helped secure the SLOCs under Russian blockade?

More than a visual framework, the model structures empirical analysis by linking maritime threats, such as exclusion zones, to responses and outcomes. Figure 1 presents the model's initial iteration, which will be refined as research progresses and shared with the academic community to foster dialogue and validation.

A structured framework for scholarly analysis:

Logic models are widely used in organizational studies to map causal pathways from inputs to outcomes ^[6]. In BBL's research, the logic model is applied across multiple embedded cases of Ukrainian maritime operations, ranging from territorial control to disruption and high-risk missions. BBL's model is structured around four interdependent stages that trace Ukraine's engagements from strategic pressure to systemic outcomes:

Stage I: Precursor conditions

It involves the context that necessitated military action and adaptation. The Russian blockade is the primary precursor, creating an urgent need for Ukraine to maintain access to its SLOC. The blockade threatened not only civilian exports but also military logistics and allied situational awareness.

Stage II: Intervention complex

Faced with these pressures, Ukraine's response is conceptualized through three categories. Technical assistance reflects external support, notably the integration of NATO-compatible systems. Brokerage services capture domestic mobilization and international facilitation efforts aimed at improving agility and coordination. Capacity building outlines the contributing factors of organizational shifts, such as revised doctrines and enhanced civil-military cooperation, within the Ukrainian armed forces as part of their adaptation process.

Stage III: Military operations in practice

This stage captures how strategic intent was operationalized through decisions and actions that increased Ukraine's lethality at sea. It focuses on how these operations – such as strikes, raids, and maritime insertions – enhanced the protection of SLOCs by degrading Russian capabilities and securing critical maritime access.

Stage IV: Phased Outcomes

The final stage documents the results of these adaptations. Outcomes are categorized into three temporal stages:

- Immediate (0-6 months):
Tactical gains such as increased export tonnage and successful maritime sorties.
- Intermediate (6-18 months):
Operational impacts, including the continuity of maritime logistics under contested conditions.

- Long-term (18+ months):

Strategic effects such as the restoration of key transit corridors, strengthened deterrence against future aggression, and a shift in the naval balance in the Black Sea.

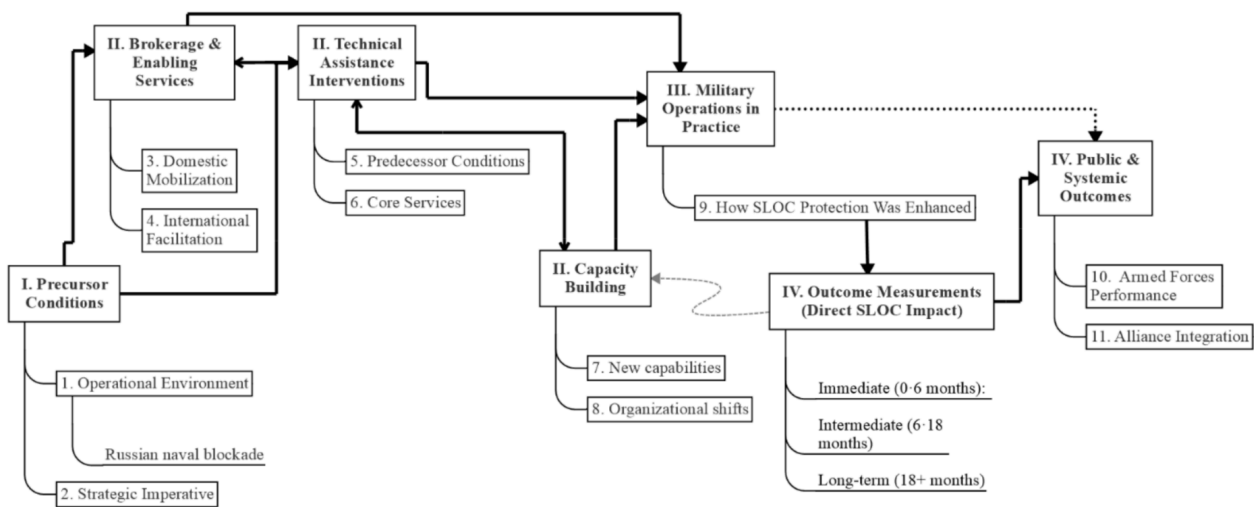


Figure 1: BBL's Logic model – version 1.0, SLOC = Sea Lines of Communication, Adapted from Yin [5].

Three key analytical functions of the model:

First, the model can elicit tacit knowledge by capturing undocumented frontline adaptations – such as methods for preventing Russian interference with neutral shipping and the use of unmanned sea drones to deny Russian sea control – that proved effective despite falling outside formal doctrine.

Second, it can enable contextual interpretation by decentering NATO doctrinal assumptions, allowing analysis of adjustments to Ukrainian institutional standards and traditions. This reveals how practices like decentralized decision-making reflect innovation, not deviation.

Third, the model can help identify how military reasoning is shaped by situational factors, explaining why high-stakes decisions – such as non-standard targeting processes during maritime warfare – can be both rational and tactically superior.

Insights and implications

BBL's logic model outlines the causal pathway from strategic pressure to operational outcomes, demonstrating how deliberate, adaptive, and context-dependent military actions influence results. It highlights how adaptations can generate not only tactical gains but also strategic benefits, such as restored exports, enhanced deterrence, and improved interoperability, all encapsulated in the model's structure.

As a transferable framework, our model offers academic efforts three critical advantages:

- Analytical rigor: Structures battlefield adaptations into actionable pathways.

- Doctrinal development: Identifies transferable practices for contested maritime domains.
- Futureproofing: Provides a methodology for tracing change in state-on-state warfare scenarios.

For countries facing similar security challenges, Ukraine's hard-earned combat experiences – analyzed through this model – offer a replicable blueprint decoding how and why operational resilience can outweigh material strength.

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