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MARITIME TRADE WARFARE IN THE 21st CENTURY

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Abstract

Policy makers and operational commanders continually find themselves searching for alternatives to the direct use of force in order to accomplish strategic and operational objectives. Historically, one option available to policy makers in times of peace to coerce an adversary has been trade sanctions, normally enforced by maritime interception operations, denying some critical import to affect his decision-making. During wartime, operational commanders think in terms of blockading an enemy to directly attack a critical vulnerability thereby assisting to defeat the enemy's center of gravity. Regardless of whether wartime or peacetime, executing a strategy of deprivation against an adversary poses a challenging problem for the operational commander. This paper explores the factors that must be considered by the commander when employing maritime trade warfare and how new and emerging technologies may provide new options for the operational level commander.

INTRODUCTION

Policy makers and operational commanders continually find themselves searching for alternatives to the direct use of force in order to accomplish strategic and operational objectives. Historically, one option available to policy makers in times of peace to coerce an adversary has been trade sanctions, normally enforced by maritime interception operations, denying some critical import to affect his decision-making. During wartime, operational commanders think in terms of blockading an enemy to directly attack a critical vulnerability thereby assisting to defeat the enemy's center of gravity. Regardless of whether wartime or peacetime, executing a strategy of deprivation against an adversary poses a challenging problem for the operational commander.

All blockades are not created equal and may fail to accomplish the operational objective within the timeframe of conflict. There are numerous reasons for failure. Some blockades lack sufficient force to enforce the sanction, there may be inadequate identification of blockade runners, insufficient effect of deprivation on the target, etc. ... Provided the operational commander conducts a sound center of gravity analysis identifying a critical vulnerability that can be affected by a deprivation strategy within the desired timeframe, maritime trade warfare can achieve the desired operational effect. Through the combination of enforcement, new technologies, and market forces, maritime trade warfare can substantially contribute to the operational commander's efforts to attack an enemy's critical vulnerabilities and weaken his center of gravity.

The term blockade is a legal term. When used by one country against another, a blockade constitutes a declaration of war. More recently, the idea of "limited blockades," otherwise known as sanctions, has become the *nom de guerre* for the international

community to enforce its will against a nation without resorting to armed conflict. For the purposes of this paper, blockade and sanctions will be used interchangeably with maritime trade warfare to convey the operational commander's actions taken to deprive an opponent a means of support for his country. These actions may be taken before, during or after armed conflict, and should not be interpreted as the traditional use of blockade, which was to deny the enemy the use of their navy and prevent enemy as well as neutral use of an enemy's ports and airfields.¹

COUNTER-ARGUMENTS

An argument against deprivation strategies is they have been made obsolete by technological changes. Chief among those are the advanced coastal and littoral defenses employed by the more technologically advanced nations. These defenses are designed to prevent an enemy from obtaining local sea control and subsequently affecting the homeland or its shipping.² This has led to the "distant blockade" school of thought, the idea that a blockade can be employed effectively without stationing forces within the threat envelope of the adversary's shore. A distant blockade can also result in a more porous blockade. It may provide ample opportunity for blockade runners to defeat it, providing sufficient import to allow the adversary nation to continue to thwart the policy makers or the operational commander in the achievement of his objectives.³

Another argument against blockades in the 21st Century is the pervasiveness of media access for the world's population. The operational commander may be faced with the

1 U.S. Navy, *The Commander's Handbook on the Law of Naval Operations*, Naval Warfare Publication (NWP) 1-14M (Washington, DC: Office of the Chief of Naval Operations, July 2007), 7-9.

2 Milan N. Vego, *Joint Operational Warfare Theory and Practice* (2007; repr., Newport: U.S. Naval War College, 2009), II-58.

3 Gabriel B. Collins, and William S. Murray, "No Oil for the Lamps of China?" *Naval War College Review* 61, no. 2 (Spring 2008): 84-86.

dilemma of whether or not to open fire on a blockade-runner. As well as the legal considerations of the action, the operational commander might then have to deal with the environmental and subsequent public opinion effects of sinking a large merchant ship, such as a VLCC (Very Large Crude Carrier), which has the potential to spill millions of gallons of oil in the waterways. World backlash against the environmental damage, instability caused in world oil markets, and loss of life may make future blockade enforcement acts less tenable leaving the operational commander with fewer options to continue the blockade.⁴

Finally, a blockade may be overcome via air resupply. Much like the effects of the blockade-runners, air resupply, especially when complemented by a rationing strategy and coupled with the gains from blockade running, can allow an opponent to mitigate the effects on their center of gravity, greatly reducing the desired effect predicted by the operational commander. An example of this occurred during the Berlin Airlift of the Cold War. Stalin, in the face of the monumental effort put forth by the allies of flying in 13,000 tons of supplies daily, decided to end the Berlin Blockade when he came to the conclusion he would never realize his objectives.⁵

DISCUSSION / ANALYSIS

Enforcement

A deprivation strategy, where a commander uses his forces to deprive an enemy of a critical import(s), is destined to fail if employed against an unsuitable target. One indicator of suitability is the types of imports. A country which is a net exporter may not be a suitable candidate for a denial strategy unless a critical import can be identified which the country

4 U. S. Government Accountability Office, *Maritime Security. Federal Efforts Needed to Address Challenges in Preventing and Responding to Terrorist Attacks on Energy Commodity Tankers. Report to Congressional Requesters* (Washington, DC: GAO, 2007), 31-36.

5 Cold War Museum, "The Berlin Blockade," http://www.coldwar.org/articles/40s/berlin_blockade.asp (accessed May 02, 2011).

cannot otherwise obtain, and the operational commander is able to sufficiently interdict the imports of that item. Conversely, a country which relies on imports for the majority of its trade may also be an unsuitable target if the commander finds himself without sufficient forces to interdict the overwhelming amount of shipping. The country's population distribution may also be a contributing factor. A country whose population is primarily agrarian may be a poor candidate for a deprivation strategy; such a population is probably more than capable of accepting a minimal reduction in their living standards. Conversely, a country whose population is primarily urban and industrialized will likely have a more difficult time resisting a blockade due to a reliance of food and energy imports, as well as a need to export finished goods to support their economy. Lastly, a non-island nation will be especially difficult to successfully prosecute a denial strategy against. These countries can import vital materials through their common borders with other countries if those neighboring countries are either allied with them or neutral in the conflict.⁶

In wartime, a close blockade is used when the commander desires to prevent an enemy's forces from leaving port. A close blockade would require forces stationed outside each commercial port to interdict contraband shipping. A chief advantage of the close blockade is the situational awareness gained by having forces stationed in close proximity to the enemy and the surveillance of all shipping entering and leaving the port, including smaller ships that be engaged in blockade running or trans-shipping operations. A close blockade also provides a greater assurance of the destination of a ship due to the close proximity of the blockade force to the destination port as opposed to a distant blockade where the blockading force may be deceived by the target ship's movement or false declarations of destination. The close blockade does suffer from some serious limitations.

⁶ Richard Mobley, "The Beira Patrol," *Naval War College Review* 4, no. 1 (Winter 2002): 79-80.

For any appreciable number of ports, a close blockade will require a large number of forces to both patrol a country's coastline as well as board and inspect suspect shipping. For example, the Royal Navy calculated it would require seven carriers and thirty escorts to blockade the entire coast of South Africa and Mozambique in its efforts to stop oil shipments to Rhodesia.⁷ In addition, a close blockade requires stationing forces within range of both an enemy's coastal defenses and attacks from land based aircraft.

Conversely, a distant blockade uses the commander's forces to attack an enemy's sea lines of communications (SLOC) rather than their terminal points. Adapting this concept to maritime trade warfare, the commander can interdict shipping along the trade lines, at strategic chokepoints, and points of origin rather than the terminal points. Interdicting commerce at these few points requires a smaller number of forces to accomplish the mission. In addition, by employing the distant strategy, the commander reduces the risk to his forces from enemy attack by shore installations and land-based aircraft.⁸

Historically, the operational commander's biggest challenge when employing a deprivation strategy has been balancing the factors of space and force. Conducting blockade operations typically involves the problem of employing limited numbers of forces long coastlines. However, the evolution of shipping to the standard shipping container has resulted in the growth of merchant ships to ever-larger sizes, and more importantly, deeper drafts. For example, in 1980, the first 4,100 TEU (twenty-foot equivalent unit) ship was delivered, a standard that increased to approximately 5,000 TEU over the next decade, which reached the beam limit of the ability to transit the Panama Canal. Since then, ship capacities have continually increased as shipping companies have adjusted their routes to accommodate

⁷ Ibid., 75.

⁸ Collins and Murray, "Lamps of China," 81-82.

larger ships; today's largest ships are over 15,000 TEU.⁹ This has implications for the operational commander in his choice of blockade type. As ships have grown larger, they are able to enter and offload at fewer ports. Another evolution of modern shipping is the oil terminal and the VLCC and LNG (Liquid Natural Gas) carrier. These specialized ships often offload their cargo at terminals located far from the shore due to their large size, or in the LNG's case, extremely hazardous cargo. These cooperative limiting factors have the operational effect of minimizing the space of the operation. This allows the more efficient employment of limited forces, guarding the fewer capable ports or terminals rather than the entire coastline.

Another enforcement strategy option available to the operational commander is mining. There are a variety of ways an operational commander may employ mines in a maritime trade warfare scenario. One way is to sow mines at the entrances of the opponent's ports to deny the use of those ports to the enemy. Today's mines can be programmed to detonate in a variety of ways, enabling the selective targeting of large ships while allowing smaller traffic to pass. These weapons can be deployed from either aircraft or submarines.¹⁰ Another method is to use "dummy mines" as was employed in Nicaragua to achieve the psychological effect of a minefield while minimizing the actual sinking of shipping.¹¹ Finally, the last means of employment available to the commander would be the psychological threat of mines. Declaring the waters mined, whether they are or not, will incur a psychological cost to the adversary's trade. Neutral shipping may decide to forego

9 Global Security, "Container Ship Types," <http://www.globalsecurity.org/military/systems/ship/container-types.htm> (accessed April 08, 2011).

10 U.S. Navy, "U.S. Navy Mines," http://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=700&ct=2 (accessed April 10, 2011).

11 Sabrina R. Edlow, *U.S. Employment of Naval Mines: A Chronology*, White Paper, (Alexandria, VA: Center for Naval Analyses, 1997), 9.

their cargos rather than assume the risk of transiting uncertain waters. During Operation STARVATION, the Allied mining campaign against the Japanese during the closing months of World War II, Japanese commanders were hesitant to travel routes where mine laying activity had been observed until minesweeping operations had been conducted, and even then, only if absolutely necessary.¹²

Today's VLCC tankers carry up to 84 million gallons of oil (2 million barrels * 42 gallons per barrel).¹³ A spill of even a fraction of this would cause a headline-grabbing incident, along with the corresponding loss of life from the ship's sinking. This can be mitigated by the commander in a couple of ways. One, the commander can have spill containment equipment at the ready whenever conducting blockade operations. Second, the commander, rather than sinking vessels, can seize the vessels and release the crews.

New Technologies

Newer technologies will play a decisive role in future maritime trade warfare operations. One of these technologies is the Automated Identification System (AIS). AIS is a transponder which provides "the ship's identity, type, position, course, speed, navigational status" as well as next port of call to receiving stations and other AIS equipped ships.¹⁴ Through the collection and analysis of AIS data, which is available via the internet and could also be collected using space-based assets, the commander can build a history of typical shipping patterns of the target nation. This enables not only the identification of inbound shipping to the target nation via their own reporting, but also highlights suspect shipping for

12 James A. Meacham, "Four Mining Campaigns: An Historical Analysis of the Decisions of the Commanders," *Naval War College Review* 19, (1967): 100-101.

13 U. S. Government Accountability Office, *Maritime Security*, 32.

14 International Maritime Organization, "AIS Transponders," <http://www.imo.org/OurWork/Safety/Navigation/Pages/AIS.aspx> (accessed April 08, 2011).

further investigation. This winnowing of potential targets enables the the commander to employ fewer forces over larger areas, helping achieve the space-force balance, while still achieving his operational objectives. In effect, AIS can serve as a commercial off the shelf distant blockade force enhancer for the identification of target vessels along the SLOCs, while allowing the commander to use his forces in a close blockade.

An argument against AIS use is it can be falsified or removed from ships making blockade enforcement more challenging.¹⁵ While true, this assertion does not automatically rule out a deprivation strategy for two reasons. First, a large ship on approach to an adversary's port that is not broadcasting AIS immediately becomes a suspect vessel for boarding and equipment and cargo verification. Rather than deceive the commander, this may make the vessel a contact of interest. Second, a vessel that seeks to camouflage its intentions by programming misleading information into the system will also make itself suspect by virtue of historical analysis. If the vessel has over the preceding months made routine runs to the enemy's ports, but now alters its routes at the commencement of the blockade, this vessel also immediately makes itself a candidate for verification boarding to inspect the cargo, bills of lading, and the vessel itself is indeed proceeding to the alternate port and not the adversary's. As an example of traffic analysis in use during the Rhodesia blockade, the Royal Navy identified the Greek flagged vessel *Joanna V* as suspect after she sailed from the Arabian Gulf to the Netherlands via the Suez Canal. However, on the return trip, rather than traveling via the Mediterranean and the Suez Canal, she headed for the South Atlantic as if to round the tip of Africa, identifying her as a potential blockade-runner.¹⁶

15 Nick Brown, "Shipping Emerges From the Dark," Janes Online, <http://janes.com/> (accessed May 01, 2011).

16 Mobley, "The Beira Patrol," 67.

Another technology available to the commander not available in previous blockades is space-based surveillance sensors. Satellites can provide the commander with a broad area picture of the marine traffic enroute to the adversary's ports. This imagery need not be strictly sourced from military systems; a quick internet search will reveal commercial imagery companies such as GeoEye, DigitalGlobe, Spot Image, and Rapid Eye all offer various imaging products. Because the ships in question are hundreds of meters long and relatively slow, commercial satellite imagery, with a one-half meter resolution in the case of GeoEye, is well suited for the task.¹⁷ Additionally, multispectral imagery of vessels can also assist in cargo and suspect determination. Finally, satellite interception of both the electronic emissions from vessel radars and radios and the interception of communications from cell and satellite phones will further allow the commander to narrow the focus of his blockade efforts.

Space-based surveillance is not a cure all. Two of the bigger limitations are weather and timeliness. Clouds can easily thwart even the most sophisticated imaging systems by blocking the target and orbital mechanics ensure the satellite cannot provide continuous coverage as it must orbit the earth, unless it is in geosynchronous orbit. However, at a distance of approximately 26,000 miles, geosynchronous orbits are not suitable for imaging satellites. These limitations can be overcome if the space-based surveillance is augmented with unmanned aerial vehicles (UAV).¹⁸

UAVs are another new technology not available in previous blockades. UAVs can provide the operational commander with 24 hours per day, seven days per week coverage of

17 GeoEye Inc, "GeoEye Product Specifications," <http://www.geoeye.com/CorpSite/products-and-services/imagery-collection/satellite-imagery-products/product-specifications.aspx> (accessed April 10, 2011).

18 Roger W. Barnett, "Technology and Naval Blockade: Past Impact and Future Prospects," *Naval War College Review* 58, no. 3 (Summer 2005): 94-95.

an opponent's ports. For example, the ship launched Scan Eagle UAV provides greater than 24 hour endurance, infrared capability for nighttime and adverse weather imaging, and AIS for target identification.¹⁹ Combining UAVs with AIS, satellite, and the organic sensor coverage of the blockading force completes the surveillance picture and provides the commander with unparalleled situational awareness of the battle space. These surveillance technologies act as a force multiplier allowing the commander to cover more of the operational space with fewer forces.

Finally, the last new technology that needs to be considered in the employment of a deprivation strategy by the operational commander is cyber warfare. With the establishment of United States Cyber Command in May of 2010, cyber warfare has grown from the image of the lone hacker wreaking havoc with an adversary's computer networks to an organized command dedicated to denying and disrupting an adversary's cyber operations. In the context of maritime trade warfare, cyber warfare could be used to attack the infrastructure supporting the adversary's ports. In 2010, a worm was constructed by an unknown entity called Stuxnet. Stuxnet attacks the control mechanisms used in industrial systems, in this case, items specific to an Iranian nuclear facility.²⁰ A similar attack could be performed against an opponent. In fact, defending against these types of cyber-attacks was highlighted by the U.S. Army's Training and Doctrine Command. They stated future opponents will attempt to "delay or disrupt US access to the theatre or area of operations by striking key infrastructures, such as aerial and sea ports of debarkation and embarkation, lines of

19 Insitu Inc., "ScanEagle Product Specifications," <http://www.insitu.com/documents/Insitu%20Website/Marketing%20Collateral/ScanEagle%20Folder%20Insert.pdf> (accessed April 10, 2011).

20 Antonin Gregoire, "Stuxnet, the real face of Cyber Warfare," <http://www.iloubnan.info/politics/actualite/id/52568/titre/Stuxnet,-the-real-face-of-Cyber-Warfare> (accessed April 10, 2011).

communication, staging bases, domestic and [supervisory control and data acquisition] systems, and sea and air transports." ²¹ Similarly, the operational commander may be able to employ like attacks against an adversary, attacking the automated loading/unloading facilities, computer networks, power supplies, and transportation systems, rendering his port facilities inoperative.

Another option available to the commander is the denial or disruption of global positioning system (GPS) services in vicinity of the ports. Today's large commercial vessels, in efforts to increase efficiency and reduce costs, are minimally manned and highly automated in regards to navigation. These navigation systems rely largely on the GPS, especially when out of visual and radar range of navigation aids. In 2008, the General Lighthouse Authorities of the United Kingdom conducted a GPS denial exercise to study its effects on maritime navigation. In the conclusion of the study, it was stated that GPS disruption would have a significant impact on the maritime domain. Specifically, for ships:

Navigation, situational awareness, chart stabilization, and DSC [Digital Selective Calling] emergency communications will be lost if they are based on GPS. Some vessels have integrated bridge systems, which enable automatic execution of a passage plan on autopilot. If this system is operating at a time when jamming occurs then, depending on the system design, the vessel's course and heading may change without informing the watchkeeper, potentially leading to extremely hazardous consequences. At this point, continuation of navigational safety is dependent on mariners' abilities to recognize that GPS service is being denied and to operate effectively using alternative techniques (e.g. radar parallel-indexing). Increased use of ECDIS [Electronic Chart Display Information System] will increase the attendant risks. ²²

21 International Defence Review, "Charting the Course Through Virtual Enemy Territory," Janes Online, <http://janes.com/> (accessed May 02, 2011).

22 GPS World, "Maritime Jamming Trial Shows GPS Vulnerabilities," <http://www.gpsworld.com/transportation/news/maritime-jamming-trial-shows-gps-vulnerabilities-6878> (accessed April 10, 2011).

One has to look no further than to the grounding of the USS *La Moure County* (LST 1194) in September 2000. The ship ran aground off the coast of Chile primarily due to a crew error in programming the GPS receiver, causing it to display inaccurate data for the chart they were navigating on. Through these soft power attacks, the operational commander could reduce the number of serviceable ports available to the adversary, limit the amount of space required to be patrolled during the blockade and subsequently reduce the forces required for enforcement.

Market Forces

Establishment of a blockade or the announcement of maritime trade warfare against a nation could have significant effects on the shipping industry. Prior to 1920, most nations owned and flagged the majority of their shipping fleets. Following World War II, the rise of globalization and the creation of a standard shipping container led to the emergence of global shipping conglomerates. These companies practiced a procedure known as flags of convenience, whereby they register their ships in the country that provides the most advantageous law or tax codes. In its 2009 Report, Review of Maritime Transport, the United Nations Conference on Trade and Development determined approximately 68 percent of the dead weight tonnage of worldwide shipping is flagged in a country foreign to the company that owns the vessel.²³ Maritime warfare operations would force shipping companies to abandon their normal routes due to increased insurance rates and risk to their vessels. Absent national ownership of shipping, an adversary may find itself unable to challenge a blockade even if it desires to.²⁴

23 U. N. Conference on Trade and Development, *Review of Maritime Transport 2009*, UNCTAD/RMT/2009, Geneva: United Nations Conference on Trade and Development Secretariat, 2009, 53.

24 Michael C. Grubb, "Merchant Shipping in a Chinese Blockade of Taiwan," *Naval War College Review* 60, no. 1 (Winter 2007): 96.

Increased shipping rates and risk to vessels are not the only tools the operational commander can employ to affect market forces and their impact on the blockade. In their study of game theory as it relates to sanctions, authors T. Clifton Morgan and Navin A. Bapat put forth some striking conclusions that have applicability to the operational commander. The authors put forth six hypotheses from their work, two of which are of particular interest. The authors suggest that the higher the penalty for sanctions violation, the less probability a company will violate them.²⁵ The commander can take advantage of this fact and increase the cost on potential blockade-runners by either sinking or seizing the ships or their cargo, by identifying the ship's owner and imposing fines, or freezing assets of the offending party. Another hypothesis states that, "As the value of exchange a firm anticipates completing prior to detection by the sender state increases, the probability a firm will violate sanctions law increases."²⁶ In other words, a company will pursue blockade running if it feels it can accomplish it a sufficient number of times to earn enough profit before being caught. The commander can take advantage of this through his unparalleled situational awareness as discussed previously. By identifying potential blockade-runners early, he can then expose them to their governments and in the press prior to them arriving at the adversary's ports, potentially heading them off without the use of force. Finally, at the strategic level, a wealthy nation such as the United States could potentially buy itself a blockade by approaching the shipping companies and offering to purchase their consignments normally destined for the enemy. A company faced with the choice between the loss of revenue, or worse, a vessel, may be inclined to accept this strategy as far less risky and therefore more acceptable.

25 Morgan, T. Clifton, and Navin A. Bapat, "Imposing Sanctions: States, Firms, and Economic Coercion," *International Studies Review* 5, no. 4 (2003): 76.

26 Ibid.

Critics of the market shaping and economic methods of blockade enforcement point to historical cases where blockade running was prevalent, and to the capability of air resupply, such as was conducted during the Berlin airlift. These criticisms are both true and false. True in that as many people point out, the Union Navy expended great effort in attempting to enforce a blockade against the South, but failed as the South maintained sufficient imports via blockade-runners to continue fielding its army. While true on the surface, deeper analysis reveals the blockade had a significant attritional effect on the South as it raised costs on imports, reduced exports that provided much needed revenue to the southern government, and hampered intraregional transport of goods and materials, eventually exhausting the South as much as the Union Army on the battlefield.²⁷ With respect to the Berlin Airlift, for eleven months the Allies supplied needed supplies to Berlin after the Soviet Union ceased all road, rail, and shipping traffic to the West German sector. The airlift required the efforts of the United States, United Kingdom, Canada, Australia, New Zealand, and South Africa. Organizing an effort of this magnitude today seems improbable.

CONCLUSIONS and RECOMMENDATIONS

Regardless of the operation, the commander must judiciously balance the factors of time, space, and force in order to accomplish the objective. In the case of blockades, space-force is the primary relationship. The commander can pursue one of two methods, enacting either a close or distant blockade. Choosing the close blockade carries the two chief disadvantages of requiring a large number of forces to patrol the adversary's coast and stationing those forces within range of land based air forces, and in some cases, shore based defenses as well. In the current U.S. Navy, a force of fewer, more capable ships, the close

27 David G. Surdam, "The Union Navy's Blockade Reconsidered," *Naval War College Review* 51, no. 4 (Autumn 1998): 104.

blockade strategy may be considered impractical due to insufficient forces available and the risk to those forces that a close blockade might entail. A distant blockade, on the other hand, suffers from the drawback of being a more porous blockade, allowing trans-shipment operations and blockade-runners. Faced with the reality of not having sufficient forces available to pursue one strategy versus not being able to sufficiently enforce the blockade if pursuing the other, clearly, a new approach is required.

Maritime trade warfare in the 21st Century should employ a hybrid blockade strategy utilizing newly available technologies and shaping of the battle space through market forces and cyber warfare. To address the large number of forces required to patrol the opponent's coastline, the hybrid approach, through careful analysis, first winnows the number of ports requiring surveillance. With the majority of shipping companies utilizing large container vessels, the commander need only focus on those enemy ports capable of receiving them. Some shipping requires even more specialized port capability, such as terminals for oil tankers or liquid natural gas carriers, further narrowing the candidate ports.

Next, the commander can employ different denial operations to further limit the number of ports requiring surveillance. One method would be mining. Mining, whether real or perceived, can force an adversary, or the shipping companies themselves, to suspend operations at a port until sufficient mine clearance operations have been accomplished. The commander may also be able to employ elements of cyber warfare to attack either the port facilities themselves, or the transit or power systems supplying them. Having sufficiently narrowed the number of ports that must be patrolled, the commander can now effectively employ his limited forces to enforce the blockade or sanction.

Market forces can be used to assist the distant portion of the hybrid blockade. Any form of maritime trade warfare is likely to cause disruptions in the global shipping industry. Whether due to the sinking or seizures of vessels or the declaration of an exclusion zone, any form is likely to lead to higher insurance rates for the shipping companies. As most cargo today is carried by foreign flagged vessels, an adversary may find themselves in the position of not being able to afford sufficient shipping willing to incur the higher costs to run the blockade. Functionally, this is equivalent to the distant blockade's concept of intercepting the shipping along the SLOC. Lastly, the commander may in effect be able to buy himself a blockade. As revealed in the application of game theory to sanctions enforcement, it is possible for the commander to set the conditions necessary to dissuade firms from engaging in blockade running activities.

Conducting maritime trade warfare in the 21st Century will require the operational commander to employ new techniques to achieve success. By combining the more favorable traits of both the close and distant blockade strategies, incorporating newer technologies to their maximum advantage, and enacting market and economic strategies to shape the behavior of global shipping companies and vessel captains, the operational level commander can ultimately achieve his objectives using a fraction of the force required in previous operations and with less risk.

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