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# ROLE OF THE SUBMARINE

—A STATISTICAL STUDY

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*"Indeed, one of the most important Characteristics of the Successful Officer of today is his ability to continue changing his methods, almost even his mental process, in order to keep abreast of the constant change that modern Science brings to the Battlefield."*

DWIGHT D. EISENHOWER

## INTRODUCTION

THE object of this study is to bring to light, by facts and figures, the decisive potentialities of the submarine, and show how the submarine is the cheapest and yet, perhaps, the most effective weapon existing today. From a study of World War II certain lessons can be learnt. From figures available today certain amount of thinking is possible for the future.

As far as World War II is concerned only few people know the exploits of the submarines, except perhaps of the German U-Boats. They fought no spectacular battles which might splash the headlines. The National War Colleges set the study of this warship aside. Yet the submarine did what no other type of ship could do. It operated all alone, unlike any other ship, and, despite the meagre attention paid to submarine warfare before the War by both the Allied and the Axis Countries, it turned out to be the dominant weapon of World War II. We should also remember that World War II demonstrated that it was not on the battle field that the result of the War was mainly decided but on the destruction of the enemy's war potential and economy. With the vital supply lines extending across the Atlantic ocean, the Baltic, Mediterranean and Black seas, it was also this war which convincingly demonstrated the potentialities of the submarine as a weapon for undermining the enemy economy. Since then, of course, both the range and the fire-power of the submarine have been immensely augmented with the development of the Polaris missile and nuclear propulsion.

Winston Churchill, speaking of World War II said, "The only thing that ever really frightened me during World War II was the U-Boats peril. Invasion, I thought even before the Air Battle, would fail. After the air victory, it was a good battle for us, we could drown and kill this horrible foe in circumstances favourable to us, and as he evidently realised, bad for him. It was the kind of battle which, in the cruel conditions of war, one ought to be content to fight. But now our life-line even across the broad oceans and especially in entrances to the Island was endangered. I was even more anxious about this battle than I had been about the glorious air fight called the Battle of Britain."

Again, speaking of the Submarine Service at the end of the War, and recapitulating their achievements in the defence of Malta and the cutting off of Axis supplies for Africa, he said, "Great deeds have been done in the Air and indeed on land but nothing surpasses your exploits."

That was 20 years ago; today, the submarine is the "giant-killer". Even the Russians, believed by many to confine themselves to a land strategy, have realised, in Mr. Khrushchev's words, that "Struggle at sea must precede the concluding victory over land."

As an anti-submarine weapon, the submarine has been given the utmost importance. Britain's first two nuclear submarines are specially designed for A/S work.

Aircraft as anti-submarine weapons are ineffective against the True Submarines. Conventional destroyers are too slow and lack endurance. Aircraft carriers are too expensive. Unless the Navy develops surface ships with hydrofoil or catamaran configurations to enable them to reach higher speeds, it seems that most surface ships will be obsolete in few years.

The Arctic will be the future home as well as the hunting ground of Nuclear Submarines. There, no other type of warship or aircraft can operate. That is the new strategic battle-field and the launching ground for submarine-based missiles.

The submarine is the outstanding strategic and tactical weapon of the nuclear age. It qualifies as the ideal deterrent. It is the only weapon which can cover the entire globe while fulfilling all the exacting demands of war: mobility, endurance, surprise and an almost absolute degree of immunity. In short we see for the first time in history that an essential Naval Arm, the submarine, provides the decisive weapon for any future war.

## WORLD WAR II

Submarine warfare was unwanted and unexpected by Hitler, unprepared for by the German Navy. It was the loss of its naval fleet that forced the Nazis to confine the German naval effort to the U-boats. However, it was only after 1943 that the entire German naval effort and a large part of its war production were concentrated on making the submarine warfare a success. By then Germany had already lost the battle of the seas.

Table 1

### Submarine Strength of Navies at the begining of World War II

Axis Countries	Allied Countries
GERMANY: 57 including 26 ocean-going type)	U.S.A.: 111 including 70 ocean-going type.)
ITALY: 60	U.K.: 57 (of various description, including small coastal boats)
JAPAN: 60 (including 47 ocean-going type)	U.S.S.R.: 235 (mainly small coastal type)

While only one-third of the German submarines could actually be present in the War Theatre, one-third being on passage to and fro and the remainder repairing and refitting, they played such havoc that Great Britain would have been starved to defeat had Germany been thoroughly prepared for Submarine Warfare.

With the United States entering the War in 1942, the fight became an uneven struggle. For every German submarine at sea, the Allies had ten anti-submarine ships and twenty A/S aircraft. The German Air Force never co-operated with the Navy's submarines. Despite this, the Allies could win the battle in the Atlantic only by a narrow margin.

The United States Submarine Fleet constituted an outlay of merely 0.7% of the total expenditure on the U.S. Navy during World War II. For the first six months of the War in the Pacific, the submarines were the only American naval craft to operate against the Japanese.\*

#### Axis Shipping Tonnage Losses

The North African Campaign has been studied by almost every Officer and it will be interesting to know what part the Allied Submarines played in it.

More than half of the Logistic Supplies to the German Army in Africa were sunk by the submarines. Rommel and his Staff repeatedly implored Hitler for tanks, petrol and food. Little of it could reach him across the seas patrolled by the Allied Submarines.

While the Allied Armies marched over Africa flying their victorious banners, the submarines did their job silently and effectively.

Table 2

#### Allied Shipping losses per year in the Atlantic-Mediterranean Sector

Year	Ships lost	Tonnage (in million tons)	No. of U-Boats at Sea	No. of Allied A/S ships and Aircraft in Ops. Vs. U-Boats
1939	110	0.45	23**	—
1940	461	2.25	70	—
1941	430	2.2	100	—
1942	1,786	6.2	210	600 ships & 1,500 Aircraft.
1943	820	2.5	300	—
1944	100	0.6	200	1,000 ships & 2,000 Aircraft.
1945	40	0.2	200	—

\* Chester W. Nimitz, Admiral, in "Submarine Operations"—Official U.S. Naval History  
\*\* About 9 at set at one time

## COST OF SUBMARINE WARFARE\*

During the entire World War, II, the U-Boats Service mustered 40,000 men who made up its active Service personnel, manned 1,168 operational U-Boats and sank 14.2 million tons of enemy shipping. To combat this small, lethal band of men and ships, the United States and Great Britain spent over one hundred billion dollars and it taxed 25% of the resources, scientific talent, production and ingenuity of the two nations. In January, 1945, the United States, alone, had 2,00,000 men, 1,500 aircraft and 800 surface ships directly in operation against Germany's paltry 100 Submarines at sea.

The Germans and Italians are estimated to have spent just half the amount, viz., 50 billion dollars on Submarine Warfare.

Official U.S. Navy Statement on U-Boats Operations in 1942-43 on the U.S. East Coast is quoted below.

"The massacre enjoyed by the U-Boats along our Atlantic Coast in 1942 was as much a National Disaster as if saboteurs had destroyed half a dozen of our biggest war plants.

"If a submarine sinks two 6,000-ton ships and a 3,000-ton tanker, here is a typical account of what we have totally lost: 42 tanks, 8 6"-Howitzers, 88 25-Pounders, 42 2-pounder Guns, 27 Armoured Cars, 50 Bren Carries, 5,210 tons of Stores and 1,000 gallons of petrol.

"Suppose the three ships had made the home port and their cargoes disposed. In order to knock out the same amount of equipment by air bombing, the enemy would have to make 3,000 successful bombing sorties."

## SUBMARINE CONTRIBUTION TO AMERICAN VICTORY

At the beginning of the War in the Pacific in 1942, Japan, including the occupied territories of Korea, Manchukuo, China and Formosa, produced 8 million tons of steel (c.f. U.S.A.'s. production of 80 m. tons.) and 4% of her petroleum requirements, imported 20% of her food needs and was totally dependent on imports for her nonferrous metals and rubber requirements.

Two million tons or 45% of Japan's shipping was devoted to the maintenance of her peace-time economy.

By 1943 (at the time of the Argonaut Conference in which the final operations against Japan were decided), Japan's foreign trade had dropped by 60%. Her supplies of strategic raw materials had been reduced by half.

By 1944, 84% of her merchant tonnage had been sunk and Japan could import only 8% of her petrol requirements. Japan had abandoned the use of sea-lanes, and with it, all that she got from her colonies. Japan's war machinery had come to a grinding halt for lack of oil and raw materials and her population was on the verge of starvation.

American submarines sank 63% of Japan's merchant tonnage and one-third of her Naval Ships, including seven Aircraft Carriers, one Battleship, ten Cruisers, 30 Destroyers and 25 Japanese Submarines.

\* From data compiled by the Washington Naval Statistical Studies and quoted in the book "ATOMIC SUBMARINE" by Clay Blair.

\*German Admiral Weneker in an impartial analysis of Japan's defeat has said, "Japanese over-confidence, underestimation of the enemy, her meagre economic-industrial base were basic causes, after that I would say the reasons for their defeat could be classed in importance: First—attacks by submarines on Shipping, Merchant and Naval; Second—destruction of the Japanese Navy, and Third—air bombing attack."

Table 3

## Allied Submarine Successes at Sea\*

A/S Effort	No. of German U-Boats Sunk	
Surface Ships	...	247
Shore-based Aircraft	...	244
Shore-based Aircraft and Ships Co-operation		62
Carrier-borne Aircraft	...	43
Carrier-borne Aircraft and Ships in co-operations (Hunter-Killer Ops.)	...	30
Mines	...	26
Submarines	...	51
Total	...	703

Table 3 shows the various anti-submarine (A/S) Forces responsible for destroying German submarines at sea. In addition, a large number of submarines were destroyed in ship-building yards by aerial bombing attacks.

Table 4

## MAJOR Battle Units Lost At Sea—During World War II\*\*\*

Causes	BATTLE UNITS SUNK		
	Battleships	Aircraft Carriers	Cruisers
Submarines	...	5	15
Surface Ships	...	6	5
Carrier-Borne Aircraft	...	8	15
Rest, including Shore Aircraft/Mines	12	10	60

Battleships, Aircraft Carrier, and Cruisers lost in World War II, and the ships/aircraft responsible for sinking them are shown in tabular form (Table 4). This gives us comparative picture of the damage inflicted by submarines, mines and shore-based aircraft on naval ships.

\* "WAR AGAINST JAPAN"—Official History of World War II B.R.

\*\* Quoted from official History of World War II "WAR AT SEA" by S. W. Roskill.

\*\*\* Quoted from Studies in U.S. Naval Institute Proceedings, February 1960.

Table 5.

## Cost Figures of Warships Today

Warship	Cost	Performance	Remarks
Porpoise Class Submarine (1959)	£2,200,000 (Rs. 2 crores & 80 lakhs approx.)	7 days submerged endurance. 19 Knots submerged. Dives to 700 feet and is silent at 400 feet at 12 Knots.	Primary British A/S ship, will be succeeded by the Destroyer of the Deep, the "Dreadnought" nuclear A/S Submarines.
"Daring" Class Destroyer (1954)	£11,050,000 (Rs. 14 crores approx.)	F P S 3 System for Gunnery. 177 A/S set and Limbo A/S Mortars.	Britain's 2nd-line Destroyer, now growing obsolescent.
"Tiger" Class Cruiser (1959)	£12,800,000 (Rs. 18 crores approx.) Cost of Armament (£3,700,000)	Carries one Tactical Sea-Air Missile.	
"Hermes" Aircraft Carrier (1960)	£18,000,000 (Rs. 30 crores) Cost of Aircraft embarked; £ 10 m. equipment equipment: £1,000,000	British Fleet Carrier.	

## THE FUTURE

COMPARISON OF WORLD WAR II BOATS WITH TODAY'S  
TRUE SUBMARINES

"The True Submarine (nuclear-powered) is 50 times as effective as the snorkel-fitted submarine which was 16 times as effective as the ordinary Submersibles with which Germany nearly won the War."\*

Although all naval craft have improved since the end of the World War II, the progress recorded in the submarines has been remarkable. Whereas the maximum speed of the destroyers, which was 30 knots then, has now gone up to 36 knots, that of the submarine has risen from 9 knots to 40 knots during the same period. Today's submarine proceeds at the 'silent speed' of 30 knots at a depth of 1,200 feet; besides, it is capable of unlimited endurance, with greatly augmented periods during which it can remain submerged without surfacing as also those during which it can be active without any refuelling. At the same time, it is economic; a Porpoise class submarine of 1959 vintage cost about one-sixth of a Tiger class cruiser of the same vintage, not accountine for the cost of armament, and about a ninth of the Head aircraft carrier (1960), without taking into accountice cost of equipping the carrier with aircraft and element equipment. Table 5 sets forth some telling cost of warships today (all figures are quoted from of April 1960, Report on Naval Estimates.)

TABLE 6

Comparative Strength of Submarine Fleets

Country	No. of Conventional Submarines.	No. of Nuclear Submarines.
U. S. A.	Over 200	45 Nuclear powered Submarines by 1965
U. S. S. R.	Over 600	Fleet of Nuclear Submarines
CHINA	Over 75	According to the U.S. Intelligence estimates, it would build some by 1964.
U. K.	46	2 Nuclear Anti-Submarine Submarines
SWEDEN	Over 30	- - - - -
FRANCE	Over 20	1 in designing stage.
U. A. R.	Over 27	- - - - -
IRAQ	Over 7	- - - - -
INDONESIA	Over 10	- - - - -
JAPAN	2	- - - - -
TURKEY	Over 6	- - - - -

These figures have been compiled from data appearing in various U.S. Naval Institute proceedings.

—Vice Admiral Rickover, Foremost World Authority on Nuclear propulsion and the father of the Atomic submarine.

A majority of the nuclear-powered submarines have been equipped with intermediate-range missiles like the American Polaris missile.

China is credited with the third largest submarine force in the world, according to U.S. intelligence sources.

Sweden is now building a new type of high-performance A/S submarine force.

Indonesia is presently acquiring about 15 more 'W' Class Submarines from the U.S.S.R.

Japan's first post-war built submarine (2,000 tons) was commissioned in 1959.

#### NUCLEAR-POWERED WARSHIPS

The prohibitive costs of nuclear-powered cruisers and aircraft-carriers capable of carrying, at present, only conventional missiles and aircraft is a significant factor. There has recently been some talk of equipping cruisers and carriers with the Polaris type of missiles. A surface ship launching base would require the support of large numbers of vessels carrying the defensive elements necessary against air, surface and underwater attack. This supporting element would be economically prohibitive to provide for a number of dispersed missile-launching units, would be impossible to conceal totally from the enemy, and would advertise the presence of the launching ship.

Recently, in a Senate statement, U.S. Defence Secretary McNamara said, "The reason of the cancellation of the Polaris installation was the cost of modifying the "Long Beach" to accommodate eight ready missiles is estimated at 57.7 million dollars or about seven million dollars per missile excluding the original cost of the ship itself and the cost of the missiles. The cost of a new nuclear Polaris Submarine, excluding the cost of the 16 missiles is, 115 million dollars—just slightly more than seven million dollars per missile installation."

Table 7  
Nuclear Powered Worships

WARSHIP	COST	REMARKS
Polaris Submarine	115 million dollars	Carries 16 missiles, 7 million dollars per 1,500-mile missile installation. 'Strategic Weapon'
USS 'George Washington'	Rs. 50 crores (approx)	
Cruiser	235 million dollars	Is equipped with tactical missiles only. 1. Terrier 2. Talos 3. Asroc
USS 'Long Beach'	Rs. 115 crores (approx)	
Aircraft Carrier USS 'Enterprise'	375 million dollars Rs. 170 crores (approx)	

TABLE 8

## Warships Maintenance Costs

Item	One 2,000-ton Submarine.	One Light Fleet Aircraft Carrier.
(a) Pay Packet	7 Officers 70 Men	100 Officers 1200 Men
(b) Fuel Consumption (Standard Index 1)	10	140
(c) Base Facilities	Needs little base support comparatively.	Large base facilities essential.
(d) Protection Screen	Not required.	At least 8 A/S ships- screen.
(e) Annual Maintenance cost (Standard Index 1)	10	150

These figures have been compiled from the following sources:

(a) Notes given at the Royal Naval Engineering College, Greenwich, (b) Admiralty Fleet Orders, and (c) The Dockyard Manual. These serve to give us an idea of the organisation and finances required for operating two types of warships, viz., a small conventional Submarine and a light Fleet Aircraft Carrier.

## THE POLARIS SUBMARINE

The Polaris submarine is capable of operating in the Arctic Ocean where and has an operational range of 1,600 miles, which is to be developed to 2,500 miles by 1964.

The Polaris submarine is capable of operating in the Arctic Ocean where no other type of ship can operate. It can shower thermonuclear destruction on any target on the earth, since no point is more than 1,600 miles from the sea.

The Polaris submarine forms the basis of the present Western Defence position, and one quarter of the Defence budget of the U.S.A. is being spent to build these submarines.

## ANTI-SUBMARINE WARFARE

The Dreadnought class atomic submarines will form the nucleus of Hunter-Killer A/S Groups in the British Navy. In addition, the U.K. has a very cheap and useful A/S craft, the Porpoise-class submarine.

The U.S.A. has also built a large number of conventional and atomic submarines for purely A/S roles. The A/S submarine has the following advantages over other A/S systems:

- (i) It operates alone, unsupported, in focal points of submarine activity.
- (ii) It operates off enemy coasts and seas where local superiority may not be ours, without support.

- (iii) It comprises the cheapest Anti-Submarine Weapons System.
- (iv) Temperature layers do not affect the A/S Submarine.
- (v) Only the Atomic A/S submarines can operate in the Arctic as an A/S forces against Enemy submarines.
- (vi) Passive Sonar is the answer to today's A/S problem and the A/S Submarine uses it to maximum advantage. In fact, it is widely accepted now that future development in A/S Warfare must be based on the 'Passive Sonar' as fitted in the 'Silent listening devices' in the Hunter Killer submarines.

### CONCLUSION

Military history is full of examples where nations have gone to war equipped with weapons and ideas used in the last war. That the concepts of warfare change with the political and economic conditions of the day and the tools of war change with the developments in science must be accepted. Following this our national commanders have continuously to think of the weapons and the methods required to achieve our objectives. This must be done with the minimum waste of manpower and material resources. Today, war embraces all forms of national activity. It particularly affects the economic well-being of a country.

For the sea-ward defence of India and to fulfil our natural responsibilities with regard to the Indian Ocean, the Submarine is an ideal ship. Like the Air Force HF-24 project, it may be feasible to start building submarines in this country.