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সুবর্ণজয়ন্তী
Bangladesh 50

Dedicated to the Father of the Nation
Bangabandhu Sheikh Mujibur Rahman

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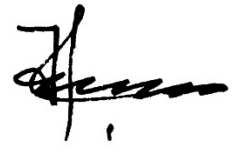
Foreword

National Defence College (NDC) is one of the leading educational institution in Bangladesh conducting research on contemporary issues of national security and development. NDC E-JOURNAL is a double-blind peer reviewed academic and professional journal launched in 2020. The journal aims to be one of the leading journals of the country and the region for its contributions in the field of security and development.

We view this publication as an academic and professional platform for comprehensive, in-depth discourse on a range of topics related to defence, security, development, leadership, strategy and policy, international relation, public policy and governance, management, war studies and social science. The journal aims to establish a theoretical framework for the fields and enrich the discourses elsewhere in the world with studies relating to the disciplines and original as well as innovative research and review articles are always appreciated here.

I am happy that we are going to publish the second issue of NDC E-Journal. I am hopeful that the papers included in this journal covering varied range of topics would be of great interest to the academia, researchers and the ordinary readers as well. The journal will be a source of essential, content-rich, accessible information, and knowledge for researchers and readers interested in security and development.

I congratulate all authors who contributed to the current issue of NDC E-Journal. I appreciate and acknowledge the hard work of editorial board to publish this journal online. I wish every success of NDC E-Journal.



Lieutenant General Md Akbar Hossain, SBP, SUP (BAR), afwc, psc, G+, PhD
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The Editor in Chief's Note

The NDC E-JOURNAL is a double-blind peer reviewed academic and professional journal that offers a unique chance to discuss, debate, and comment on national and international security and development issues, not only from the traditional perspective but also from the non -traditional spectrum. The articles are selected through a rigorous process of blind review to ensure epistemic value, high standard, and originality to debates and discourses on a diverse range of topics.

We strive to maintain high standards regarding our journal's management, credibility, and outreach with the continuous assistance of an experienced and intellectually vibrant Editorial Board, Editorial Advisors of global repute, a respectable and animated International Advisory Board comprised of revered academicians and eminent personalities, and a dedicated Editorial team comprising Section and Language editors.

We rely on our international network of authors, advisory boards, academia, NDC faculty, reviewers, and readers to help in identifying and exploring new areas of security and strategic studies scholarship. Hence, the submissions to the journal have seen significant growth and reach over the year. With such a broad base of support, we are going to publish the second issue of NDC E-Journal. This second volume has included scholarly and original articles focusing on foreign policy, United Nations peace keeping operations, nationalism, military intelligence, strategic leadership, national security outlook, post-Covid security paradoxes, military technological development and reviews.

I would like to express my gratitude to the Chief Patron, the Editorial Advisors, the International Advisory Board and the Editorial Team for their invaluable support. We are excited to continue working with all of you to make the NDC E-JOURNAL a success. For the upcoming volume, we anticipate receiving additional evidence-based, intriguingly inquisitive, and analytical articles. We welcome submissions as well as inputs from the journal's authors, readers, and reviewers.

Professor Dr. Imtiaz Ahmed
Editor in Chief
NDC E-JOURNAL

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NATIONALISM AND INTERNATIONALISM IN AMERICAN FOREIGN POLICY

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Abstract: The American foreign policy is once again in the process of transformation from nationalism to liberal internationalism after the 2020 election. Unless we appreciate the value of liberal internationalism, it will be challenging to comprehend the American contributions to international relations and contemporary political life. Compared to the Trump administration, the Biden administration seeks to "build America back" again both domestically and internationally. However, American institutionalism comes in different forms and flavors. Nonetheless, internationalists of all stripes usually are quite comfortable engaging peacefully with allies, coalition partners, or other "friendly" parties in official state-to-state contacts or in international organizations as well as in the full range of private-sector commercial and other contacts that link non-state actors within and across societies. However, what concerns the Americans is how different internationalist policy elites prefer to deal with present or potential adversaries-a multiple choice of overlapping options that varies in application from country to country. However, while internationalists will stay as a cornerstone of the American foreign policy, the Trump nationalists within the Republican Party will remain as a factor in the coming years. As a result, liberal internationalism has its firm rooting as well as challenges with the Democratic and Republican parties.

Keywords: *Nationalism, Internationalism, American Foreign Policy*

THE AMERICAN FOREIGN POLICY, NATIONALISM, AND LIBERAL INTERNATIONALISM

American President Joseph R. Biden is reversing the nationalist course set by his predecessor, Donald Trump and his administration (2017-21). The liberal internationalism of the Obama-Biden administration (2009-2017) is back. No longer is the White House committed to "Make America Great Again" (MAGA) and "America First" slogans of Trump nationalism. Cultivating ties with allies, coalition partners, and other "friendly" countries is underway even as efforts are

made to manage relations with Chink Russia, and other competitors are the new order of the day.

Throughout the post-World War II period there was a sustained consensus among both the Republican and Democratic parties that internationalism and multilateralism were key ingredients in a foreign policy that also served domestic issues. When the Trump administration took the reign of power on January 20, 1917, American foreign policy took a radical turn to the nationalist right that no longer assured allies while, at the same time, embracing authoritarian leaders and régimes in other countries.

Trump's campaign and presidential "America First" and "MAGA" rhetoric was an echo of the non-entanglement, if not isolationist, thinking deeply rooted in the American historical experience. When Trump assumed office, such rhetoric quickly took concrete form that continued throughout his administration:

(a) Unilaterally imposing tariffs on trading partners in search of a better "deal" for the United States;

(b) Questioning whether the United States should remain in costly alliances like NATO and threatening withdrawal if allies did not increase their own defense- spending contributions;

(c) Withdrawing from the 2016 Trans-Pacific Partnership (TPP) free trade agreement that his predecessor's diplomats had negotiated with East Asian and Latin American countries;

(d) Withdrawing from the Paris Agreement on climate change;

(e) Demanding replacement of the 1994 North American Free Trade Agreement (NAFTA) that had been negotiated by the Bush and Clinton administrations with a new United States-Mexico-Canada Agreement (USMCA)-a set of trade arrangements seen as more favorable to the United States than those of NAFTA;

(f) Terminating US participation in the 15-year Iran nuclear deal (the JCPOA) [1] made by the Obama administration along with the other permanent Security Council members and Germany;

(g) Pursuing an immigration policy intended to deter or dissuade those seeking asylum (or for other purposes) crossing the US- Mexican border-

[1] *Joint Comprehensive Plan of Action negotiated with Iran.*

a policy that included separation of families at the border, caging individuals in US custody;

(h) Imposing a discriminatory travel ban on selected Muslim-majority countries to include refugees from Syria, Iran, Iraq, Libya, Somalia, Sudan, Syria and Yemen;

(i) Ending US participation in the United Nations Educational, Scientific and Cultural Organization (UNESCO) for its allegedly anti-Israel bias;

(j) Withdrawal from the 1988 Intermediate-Range Nuclear Forces (INF) Treaty with Russia;

(k) Moving the US Embassy in Israel to Jerusalem from Tel Aviv, recognizing Israeli sovereignty over the Golan Heights, and legitimating Israeli settlements in territories on the west bank of the Jordan River-a move that completely disregarded Palestinian interests; and

(l) Withdrawing from the World Health Organization (WHO) in the midst of the covid-19 pandemic, alleging that China had undue influence within the WHO.

THE RETURN TO LIBERAL INTERNATIONALISM

By contrast, the Biden administration seeks to "build America back" again both domestically and internationally. After four years of often being personally snubbed by Trump, European leaders heard new assurances from Biden on February 19, 2021 at the 57th annual Munich Security Conference. In the opening of his speech he referred to a three-way meeting that day with the German chancellor and French president, calling them by their first names-a calculated friendly gesture that put all three on a coequal footing-a status he also applied "to everyone" of the governmental leaders present.

More to the point was his assurances to NATO allies and also the other members of the Group of Seven (G-7)[2] with whom he also met:

> The trans-Atlantic alliance is a strong foundation-*the* strong foundation-on which our collective security and our shared prosperity are built. The partnership between Europe and the United States, in my view, is and must remain the cornerstone of all that we hope to accomplish in the

[2] *Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.*

> 21st century, just as we did in the 20th century…. I know the past few years have strained and tested our trans-Atlantic relationship, but the United States is determined … to reengage with Europe, to consult with you, to earn back our position of trusted leadership….
>
> The United States must renew America's enduring advantages so that we can meet today's challenges from a position of strength. That means *building back* [emphasis added] better our economic foundations; reclaiming our place in international institutions; lifting up our values at home and speaking out to defend them around the world; modernizing our military capabilities while leading with diplomacy; revitalizing America's network of alliances and partnerships that have made the world safer for all people….

Rejecting the unilateralism of his predecessor, Biden halted troop withdrawals from Germany, underscoring at the Munich conference that "the United States is undergoing a thorough review of our own [US] force posture around the world," but at the same time, "I've ordered the halting of withdrawal of American troops from Germany" and "also lifting the cap imposed by the previous administration on the number of U.S. forces able to be based in Germany."

As for Russia, Biden departed from Trump's see-no-evil policy of cozying up to Vladimir Putin. Calling the Russian president only by his last name, Biden asserted how "Putin seeks to weaken European-the European project and our NATO alliance." In this regard: "He wants to undermine the trans-Atlantic unity and our resolve, because it's so much easier for the Kremlin to bully and threaten individual states than it is to negotiate with a strong and closely united trans-Atlantic community."

In a direct reversal of Trump's lack of assurance to European allies on the American commitment under Article 5 of the North Atlantic Treaty to come to the aid of any state invaded by Russia (or any other aggressor), Biden explicitly underscored that "an attack on one is an attack on all." As he put it: "The United States will work closely with our European Union partners and the capitals across the continent-from Rome to Riga-to meet the range of shared challenges we face." Singling out Riga, Latvia's capital, was also a signal to Putin lest he act on an irredentist claim to the Baltic states. It was a loud assurance of American commitment to NATO heard not only in Latvia, but also in Estonia, Lithuania and elsewhere in central Europe.

Biden addressed China and its policies as a challenge not just to the United States, but also allies and other states. He characterized it as "a long-term strategic competition with China." In this regard, he observed how "we have to push back against the Chinese government's economic abuses and coercion that undercut the foundations of the international economic system that "Europe and the United

States, together with our allies in the Indo-Pacific, worked so hard to build over the last 70 years."

Although Biden spoke of the need "to protect space for innovation, for intellectual property, and the creative genius that thrives with the free exchange of ideas in open, democratic societies," he did not detail trade disputes and concerns about intellectual property theft and human rights violations-much less the growth of the Chinese navy and other military deployments in the South China Sea area that challenge the US 7th Fleet and, more broadly, US allies (Japan and South Korea) or its partner on Taiwan, which likely will be the subject of future speeches and bilateral assurances.

As Vice-President in the Obama administration, Biden advocated an anti-terrorism mission in Afghanistan-not a counter-insurgency that would require a much larger commitment of personnel and other resources. In the Munich speech he implied that meeting the May 1st, 2021 deadline for withdrawal of forces from Afghanistan imposed by President Trump after negotiations with the Taliban depended on ongoing diplomatic negotiations. Key to the Biden is "ensuring that Afghanistan never again provides a base for terrorist attacks against the United States and our partners and our interests."

On Iraq, Biden noted how "NATO defense ministers [have] endorsed a significantly expanded training and advisory mission in Iraq, which will be vital to the ongoing fight against ISIS."3 For his part, he asserted: "We cannot allow ISIS to reopen and regroup and threaten people in the Middle East, in Europe, in the United States and elsewhere." Whether this will be a blueprint for US and allied presence in Afghanistan was left unstated.

Inn his Munich speech, Biden underscored that "we need transparency and communication to minimize the risk of strategic misunderstanding or mistakes" which is "why the United States and Russia, notwithstanding other competition, extended the New START treaty for an additional [five] years." The president also declared his openness "to reengage in negotiations with the P5+1 on Iran's nuclear program,"4 (thus reversing the Trump administration's policy) and rejoining the Paris Agreement on climate which the US under the Obama administration "helped put together." In addition to these measures, Biden asserted that "we must shape the rules that will govern the advance of technology and the norms of behavior in cyberspace, artificial intelligence, biotechnology" as well as collaboration on the covid-19 pandemic and other global challenges. Put another way, arms control, peaceful engagement, and multilateralism are back.

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[3] The Islamic State of Iraq and Syria, also known as the Islamic States of Iraq and the Levant (ISIL). In Arabic it is referred to by the acronym Da'esh.

[4] The UN permanent members of the Security Council (China, France, Russia, the UK, and the US) plus Germany.

Other reversals of Trump policies include ending the discriminatory Muslim travel ban, allowing undocumented persons brought to the US in childhood by their parents to remain in the United States under the "dreamers" (Deferred Action for Childhood Arrivals or DACA) policy; ending discrimination against asylum seekers; and pursuing an immigration policy that provides a legal pathway to US citizenship for those who have entered the US with or without documentation.

Matters still to be addressed by the Biden administration include whether the US will rejoin UNESCO and the TPP that has continued even after Trump withdrew the United States fro0m the trade agreement. Given the political and economic complexity of trade issues and the anger generated by the Trump administration's tariff policy, decisions on trade policy are likely to be made incrementally. The Biden administration's "Buy America" campaign designed to accommodate working class and corporate demands constrains efforts to liberalize US trade policy.

Finally, US relations with both Israel and Saudi Arabia-countries warmly embraced by the Trump administration-were not mentioned in the speech. On Israel, it is unlikely that the Biden administration will reverse the decision to move the US embassy to Jerusalem, although in the first month in office the president was slow to connect with Prime Minister Netanyahu-a signal to the Israeli government that the US should not be taken for granted as giving a green light to all Israeli policies. Concern with the murder and dismemberment of Saudi Washington Post journalist Jamal Khashoggi at the Saudi consulate in Istanbul which, given the importance of US-Saudi relations, was downplayed by the Trump administration has resulted in a delayed outreach by the Biden administration to Saudi leaders. Speculation is that President Biden may meet with the king, but not the crown prince who is accused of responsibility for the murder.

TRUMP'S NATIONALISM AND AMERICAN POPULISM

The nationalist perspective is deeply rooted in the American experience.[5] It was by no means an invention of the Trump administration. George Washington's address, drafted for him with substantial inputs by James Madison and Alexander Hamilton, made clear that the new republic should avoid foreign-mainly European-entanglements. Although in the nineteenth century the United States became fully engaged in Latin America (advancing its commercial interests and political values to some 20 republics carved out of the Spanish and Portuguese colonial empires), Washington's advisory defined foreign policy vis-à-vis the rest of Europe until entry into World War I (1917). The post-war years were marked by a nationalist withdrawal from European affairs until entry into World War II (1941).

[5] *For more of this history and commentary here and below, please see my American Foreign Policy and National Security (Amherst, MA: Cambria Press, 2020), ch. 1.*

The US also promoted its commercial interests in Japan and China during the late-nineteenth century, victory in its war with Spain (1898) giving American territorial control over not just Cuba and Puerto Rico in the Caribbean, but also extended to the Philippines-the Hawaiian and other islands added to enhance US naval power projection across the Pacific. An "America First" policy for advancing commercial interests while avoiding foreign entanglements in Europe was the order of the day.

Nationalist policies then and now have rested on a populist foundation- the view from the countryside consistently less prone to engage the world "out there" than those in urban, more cosmopolitan settings. The success of Washington in the revolution against Britain depended upon a rural support base for the insurgency, particularly since Britain controlled the cities. Although a majority in the colonies at the time favored the status quo and opposed the campaign against British authority, the insurgents led by Washington depended upon a populist support base in the countryside for the success he and his followers finally achieved.

Populism in the late-nineteenth century took the form of a left-oriented movement advanced famously by such leaders as Nebraska populist William Jennings Bryan. To Bryan, maintaining the gold standard-tight money-served the interests of the owners and managers of capital (what I call the OMC) but was adverse to agricultural interests in the rural areas Bryan represented.

Rural discontent stemmed economically from government-imposed tariffs on non-agricultural goods that kept prices artificially high while their agricultural commodities traded in a free-market competition particularly subject to downward pressures on price. Moreover, railroad, telephone and telegraph, oil, and other industrial monopolies were by Supreme Court ruling legal persons with due process protections of the 14th amendment to the US Constitution.

Notwithstanding this claim that inhibited their regulation by government, post-Civil War agricultural groups challenged the dominant positions held by monopolies. The Granger movement in the 1870s (later the "Alliance," another farmer organization) and other labor groups lobbied against monopolies that kept prices of their goods and services artificially high-a steep challenge particularly to cash-poor farmers. One outcome of this populist movement was the Sherman Antitrust Act (1890) that outlawed conspiracies in restraint of trade in interstate commerce. It would not be until the progressive, "trust-busting" Republican administration of Theodore Roosevelt (1901-09), however, that the Act was used to break up monopolies.

Rural groups from different parts of the country came together in 1891 in the first people's or Populist Party national convention. Their nationalist focus was on domestic prosperity that appealed to their rural, agricultural base. Among other things, they complained about the "money changers of Wall Street" (the OMC-the owners and managers of capital) and sought to replace gold as monetary standard with free coinage of the more abundant silver valued in a 16:1 ratio with gold.

Populists favored bimetallism (both silver and gold) as monetary standard-silver in greater supply, thus allowing for a more expansive money supply beneficial to labor interests. Not surprisingly, the OMC of the day saw growing the money supply in this way as inflationary and thus contrary to their capital-owning interests. Populism remained essentially a rural, nationalist movement notwithstanding efforts to accommodate urban worker interests in a party agenda that called for an eight-hour workday, limits on immigration that otherwise would drive wages down, and an end to strikebreaking tactics used by the OMC against labor interests.

For the rural constituency were proposals to ease borrowing by farmers, restricting use of public lands to settlers and away from urban and other speculators, "fair and liberal pensions" for military veterans, a graduated income tax and, on a more socialist turn, government ownership- confiscation "in the interest of the people" of railroad, telegraph, and telephone interests. Direct election of US senators rather than their selection by state legislatures populists thought would bring power to the people. 6

On the urban-rural (OMC-agricultural) divide, Bryan put it this way: "You shall not press down upon the brow of labor this crown of thorns, you shall not crucify mankind upon a cross of gold." Bryan delivered this historically famous "Cross of Gold" speech in Chicago to the Democratic Party's national convention on July 9, 1896-symbolically a high point for the left-oriented populism of his time. Bryan, the Democratic nominee, lost the election to Republican William McKinley who kept the country on the gold standard.

The populist agenda continued to be a substantial influence in twentieth-century American politics, particularly in the Theodore and Franklin Roosevelt and Truman administrations that saw substantial gains for both agricultural and labor interests. Trust busting, farm subsidies, the right of labor to bargain collectively for wages and other benefits, progressive income taxes intended to reduce inequality, social security, and conservation-the protection of national parks and other public lands from unregulated development-were among their progressive, essentially populist achievements. As president (1963-69), Lyndon Johnson-a Franklin Roosevelt "New Deal" southern Democrat-carried the progressive legacy forward through Medicare and Medicaid legislation.

On the nationalist side, however, the Smoot-Hawley tariff legislation (1930) in the Republican Herbert Hoover administration, coupled with Democratic Franklin Roosevelt's 69.3 percent devaluation of the dollar in 1934 (changing the exchange rate from $20.67 to $35 per ounce of gold) were intended to serve agricultural, labor, and OMC interests in the Great Depression-a decidedly nationalist, "America First" position. In fact, tariffs and competitive devaluation designed to dampen

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[6] *A good historical account of earlier populism is Robert E. Riegel and David F. Long, The American Story (New York: McGraw Hill, 1955), vol. 2, pp. 101-02 et passim.*

imports and promote exports vis-à-vis other countries resulted in an extraordinary reduction of world trade that did not benefit OMC, labor, or agricultural interests.

It was also a nationalist period of relative isolation from world affairs. Woodrow Wilson's liberal internationalism was repudiated. Citing the Washington advisory to avoid foreign entanglements, isolation was the order of the day-particularly toward European countries. This continued through the Republican Harding, Coolidge, and Hoover presidencies (1921-31) and into the Democratic Roosevelt administration.

Although Roosevelt and British Prime Minister Churchill forged the liberal-internationalist vision in the bilateral Atlantic Charter and the conservative-internationalist, military-assistance Lend-Lease agreement in 1940, it would take the Japanese attack on Pearl Harbor on December 7, 1941 to bring the country into its World War II great power alliance with the UK, Soviet Union, France, and China. Preparations for a post-war order made during the war, the United Nations and its system of international organizations was the landmark achievement of what had become a decidedly internationalist Roosevelt administration. From Roosevelt to Obama, internationalism had become the new constant in American foreign policy-whether in its liberal, conservative, or neoconservative, more militant variants.

Both in his campaign and in office, President Trump embraced a nationalist position even as his national security advisers and secretaries of state and defense tended to remain wedded to internationalism, whether of conservative or militant orientation. The president's rise to power was facilitated by a recurrence of populist sentiment, a right-oriented political movement. As in the nineteenth century, this populism has a decidedly southern, mid-western, and predominantly rural base. Workers in so- called "rust-belt" states that have lost industries and the jobs that went with them have also been receptive to populist appeals led by Donald Trump. Feeling left behind by an increasingly technological society in which traditional, labor-intensive agricultural, industrial, and mining jobs are increasingly scarce (and underpaid), they have gravitated politically to the right-responsive to "America First" and "Make America Great Again" (MAGA) appeals.

To them, internationalist promotion of increasing globalization advances capital but not labor interests. Although twenty-first century circumstances are different, the conflict between capital and labor is a common populist thread. As rural areas fall behind the cities in this newly globalized world, their discontent is palpable. Populists in the nineteenth century, then as now, whether politically left or right, have contended that the US should be concerned primarily with jobs and other domestic matters-not the world "out there." The convergence of populism and nationalism is nothing new, deeply rooted as it is in the American experience.

THE VARIETIES OF AMERICAN INTERNATIONALISM

Internationalists of all stripes usually are quite comfortable engaging peacefully with allies, coalition partners, or other "friendly" parties in official state-to-state contacts or in international organizations as well as in the full range of private-sector commercial and other contacts that link non-state actors within and across societies. What concerns us here, however, is how different internationalist policy elites prefer to deal with present or potential adversaries-a multiple choice of overlapping options that varies in application from country to country. Combining the three broad of options for dealing with adversaries (peacefully engaging them, containing them, or employing the use of force in armed interventions against them) with internationalist policy-elite orientations, table 1 provides us with a way to anticipate in general terms the course policy elites in positions of power or influence may take toward present or potential adversaries.

Changing circumstances in the world around them force policymakers to grapple with their understandings of threats, opportunities, and interests as they make choices or modify their decisions. These choices are moderated by the understandings of contending elites even within the same administration. In the first rounds of a bureaucratic battle on the Potomac during the lead-up to the Iraq War (2003), the conservative internationalism of Secretary of State Colin Powell and his supporters lost out to a neoconservative, more militant coalition led by Vice President Richard Cheney and Secretary of Defense Donald Rumsfeld. National Security Adviser Condoleezza Rice navigated between the two camps.

Even with battles won, the bureaucratic "war" was not over as contending elites continued to vie for the president's ear. In the first two years following the 2004 election, neoconservatives who had been dominant in the first years of the Bush administration gradually were supplanted in and around power positions by those of a more conservative-internationalist persuasion, including Condoleezza Rice who became the new Secretary of State. Although the vice president still had the president's ear, his personal influence appeared more muted in the last years of the administration. Given these shifts, the skepticism concerning negotiations with adversaries early in the administration yielded over time to attempts to engage, particularly in the Middle East, whether dealing with Iran or other trouble spots in the region.

Decision-making contexts, then, are often very dynamic. Not only do understandings of circumstances change but also the players and the policy elites of which they are a part may shift within the same administration. Nevertheless, we still have a degree of predictability, assuming we can gauge accurately both what policymaker and policy- elite orientations are (or the courses of action they generally prefer) that are captured in our nationalist and liberal-, conservative-, and neoconservative- or militant-internationalist categorizations. Knowing the positions of power or influence members of policy elites have or likely will hold gives us a predictive handle we can use to anticipate how they likely will relate to

adversaries in particular contingencies or, more generally, as part of the broader foreign policy they formulate.

Table 1: *Varieties of American Internationalism*

	BROAD, OVERLAPPING OPTIONS FOR DEALING WITH ADVERSARIES		
POLICY ORIENTATION	**PEACEFUL ENGAGEMENT**	**CONTAINMENT**	**ARMED INTERVENTION**
LIBERAL INTERNATIONALIST	center of gravity: preferred option	will seek to contain adversaries while also engaging them	willing to invade or intervene militarily as a last resort
CONSERVATIVE INTERNATIONALIST	will engage with adversaries when expectations of net gains from doing so are clear or seem particularly likely and thus warrant doing so	center of gravity: preferred option	willing to invade or intervene militarily, but likely to revert to containment sooner rather than later
NEOCONSERVATIVE OR MORE MILITANT INTERNATIONALISM	highly skeptical of any net gains to be realized through engagement diplomacy, much less arms control	center of gravity: straddles containment and armed intervention options—will contain, but most willing to intervene militarily when expectations of net gains are clear and thus warrant doing so	

Most dramatic in this regard were the shifts in policy-elite orientations that occurred beginning in 2001 between liberal internationalists in the Clinton-Gore administration and neoconservatives coming to power in the first Bush-Cheney administration (2001-2005) and the shift to conservative internationalists in the second (2005-2009). The Obama-Biden administration reverted to liberal internationalism when it came into office (2009). Following that in 2017 the Trump administration moved to a nationalist, "America-First" position that clearly marked a significant departure from the internationalism of all of his post-World War II predecessors. When policy elites in or near power positions shift as sharply as they did in this period, we also observe substantial changes in policy that follow, which are documented above in the first section of this article.

In the internationalist post-World War II period, echoes of earlier nationalist sentiments were heard from time to time, particularly during presidential elections. Some questioned why the United States should be the world's "policeman"-a role

that often meant committing US troops to foreign wars. Nationalists (often referred to as "nativists") also tended to be anti-immigrant. On trade and capital flows, they often were more protectionist. The advent of the Trump administration built on these themes-questioning alliances, withdrawing from diplomatic agreements, imposing tariffs, seeking to close borders and limit immigration.

In earlier decades policy changed, if not to the same degree, when the liberal internationalism of President Jimmy Carter gave way to the conservative-international presidencies of Ronald Reagan and George H. W. Bush. Even then, the more strident rhetoric and confrontational policy toward adversaries of the early Reagan years gave way over time to engagement with the Soviet Union and Warsaw Pact countries on arms control and other initiatives.

During the George H. W. Bush presidency (1989-93), these efforts finally culminated in the end of the Cold War, breakup of the Warsaw Pact, and dissolution of the Soviet Union! After the liberal-internationalist Clinton years (1993-2001), neoconservatives in the George W. Bush administration (2001-2009) identified themselves with and sought to revive what they saw as the essence of a "Reaganite" foreign policy premised on the supremacy of US national power-a successful challenge in their view to the Soviet "evil empire"-buttressed by a strong national economy and accompanied by commitment to robust strategic defenses to complement nuclear and conventional military forces.

Winning the November 2008 election and bent on restoring public perceptions abroad-engaging not just with friendly countries but also with adversaries-President Barack Obama and other members of his administration quickly repudiated torture and other "harsh interrogation" techniques at the Guantánamo base in Cuba, Abu Ghraib in Iraq, Bagram in Afghanistan, and other secret prisons on the "dark side" (Vice President Cheney's reference). In breaking sharply with the previous administration and adopting constructive or peaceful engagement combined with containment as its first-line approach toward present or potential adversaries, the new administration underscored its renewed commitment to multilateralism.

The pursuit of arms control and other cooperative-security agendas that, for the most part, had been set aside by the Bush administration now had a new lease on life. At the same time, of course, the new Obama foreign-policy team, which included Secretary of State Hillary Clinton, still had to balance their understandings of intelligence and other national-security requirements with moral and legal constraints they felt had not been accorded proper emphasis by their predecessors.

COMMUNICATIONS WITH DOMESTIC PUBLICS ON FOREIGN POLICY

Mass communications-both print and electronic media-connect policy elites with their respective attentive publics and with the general public. The Internet, on-line social networks, e-mail, text messaging, Skype and Zoom live audio and video

transmissions personalize, expand, and facilitate efforts by policy elites that also rely on television and radio, newspapers, published articles and books, and special mailings.

Selective-membership groups such as the Council on Foreign Relations in New York, the Chicago Council on International Affairs, the Atlantic Council, and the Pacific Council on International Policy in Los Angeles recruit from among both policy elites and attentive publics, providing both actual and virtual meeting places for their members. American Committees on Foreign Relations (ACFR) and World Affairs Councils in cities across the United States also recruit from attentive publics, providing them with limited access to members of policy elites and others whom they invite as speakers or participants in panels and workshops or connect by Skype or teleconference links.

Academics who participate as part of attentive publics on foreign- policy matters may be drawn into any of these organizations, but they also participate in meetings of such professional organizations as the International Studies and American Political Science associations or their organized sections dealing with international politics, foreign policy, or national and international security. On the latter, organizations like the International Institute for Strategic Studies (IISS) operate both globally and nationally, bringing policymakers and policy-oriented scholars together in meetings and through widely distributed print and electronic publications.

By contrast, the general public lacks even this limited degree of connectivity to foreign-policymaking elites that members of attentive publics enjoy. In part this is due to a generalized preference to leave foreign policy to the experts-a tendency one also finds in other countries. Terrorism, foreign wars, or economic challenges that stem from abroad may capture the public's interest for a while, but for the most part public attention, if on foreign policy at all, tends to be short-lived.

Given elimination in 1987 of the Federal Communications Commission's fairness doctrine, the television and radio networks are not legally required to present balanced treatment on the issues of the day. Public Broadcasting (PBS) and National Public Radio (NPR) explicitly do seek to present multiple sides of the issues they cover. Although major commercial networks (ABC, NBC, and CBS) also seek balanced, more centrist treatment of the news of the day, cable networks like Fox position themselves on the right, MSNBC on the left, CNN somewhere in between. Emerging in the Trump era, NewsMatch and the "One America News (OAN) networks are even further to the right of Fox, explicitly trafficking in disinformation and conspiracy theories that serve their right-wing followers.

Until cut off on disinformation grounds that made both Twitter and Facebook propaganda platforms, President Trump expressed his views routinely in feeds followed by millions. The proliferation of television, radio, and social networks has also allowed people a high degree of selectivity-many watching, listening, or engaging only with those sharing their own views. If not hermetically sealed, these

separate compartments or "silos" ("echo chambers") contribute to the polarization of the general public on both domestic and foreign policy matters. Facts compete with "alternative facts" in this milieu that focuses on opinions that often lack either evidentiary support or analytical validity.

The "great lie" myth that the 2020 election was "stolen" from President Trump motivated insurrectionists who occupied the US Capitol on January 6, 2021. It was ca message repeated again and again by President Trump and carried to his followers in mass communications and other social media. It was eerily reminiscent of right-wing ascendance in Germany in the 1930s (the alleged "stab in the back" by liberals that falsely blamned Germany's loss in the Great War (1914-18) on liberals-the original "great lie" advanced in media of the day by National Socialists.

Because of their greater importance to the average citizen, the politics of domestic issues generally occupy a more prominent place in their lives, although for a variety of reasons many do not participate at all even in these political processes. Contacting representatives, joining groups, writing letters to the editor, sending email messages, tweeting, or posting blogs are activities left to others. They may doubt the efficacy of their involvement-the difference they can make-in domestic (much less foreign-policy) issues, the complexity of which can be bewildering. Besides, daily personal concerns may matter more than political participation to any meaningful degree. Even voting may be too much of a chore, hence the relatively low turnouts we observe in most elections. Relatively high voter turnouts (60% or more of the electorate) tend only to occur when the stakes people see themselves having in the outcome or commitments to particular candidates or causes as being especially strong as occurred in the 2020 election.

It is from the general public, of course, that attentive publics are drawn. Interest and formal or self-education in international affairs are the ingredients that produce attentive publics on foreign-policy matters. In turn, some of the people in these attentive publics may gravitate to policy-elite circles. Although foreign policy thus remains primarily the preserve of policy elites and those who follow them in attentive publics, the general public does matter as a source of support for presidents and their administrations-policy elites in power-that have the primary responsibility for making and implementing American foreign policy.

A NATIONALIST OR INTERNATIONALIST FUTURE?

In addition to those mentioned above, three iconic presidents represented liberal and conservative variants of internationalism: Theodor Roosevelt, Woodrow Wilson, and Franklin Roosevelt. Henry Kissinger contrasts the conservative internationalism or what he calls the realism of Theodor Roosevelt with the liberal internationalism of Woodrow Wilson that he characterizes as idealism.[7] The two

[7] *See Henry Kissinger, Diplomacy (New York: Simon Schuster, 1995), ch.2.*

liberal internationalist presidents, Wilson and Franklin Roosevelt, though committed to the liberal ideals to be gained through peaceful engagement and multilateralism, turned out to be wartime presidents, which underscores how liberal internationalists are quite capable of taking the country into wars they see fighting as being in the US interest when other peaceful options have failed or seem likely to fail.

The twenty-first century has seen Donald Trump emerging on a nationalist platform not seen since prior to World War I and the 1920s and 1930s-the interwar period between World Wars I and II. Given this American history, foreign observers rightly wonder whether President Joseph Biden's liberal internationalism is here to stay as the cornerstone of American foreign policy or whether he will be succeeded, if not by Donald Trump, by someone of similar nationalist, "America First" orientation supported by partisan members of Congress of like mind. Certainly, Trump's populist support base in the American south and in rural parts of states in other parts of the country remains in place. Whether civil and criminal litigation against him in coming months and years will weaken or strengthen his political position is not clear. His followers-though a minority in the country as a whole-are resolute in their support and are not likely to be swayed by alternative narratives.

It is when ideas are grounded in interests that they cease to be "out there" as abstractions, but instead become humanized "in here" by the identity that people have with them.[8] Most Democrats tend to be liberal internationalists, Republicans not in the Trump orbit conservative internationalists. Unfortunately for internationalists of any stripe, Trump nationalists constitute the majority in the Republican Party and were they to come to power in the 2024 presidential election, both Democratic and Republican internationalists will have their work cut out for them.

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[8] *I owe this insight to my mentor at Cal Berkeley, Ernst B. Haas (1924-2003).*

International Security sections, presenting papers and chairing panels at their annual meetings. Before joining Korbel, he was on the political science faculty at the Air Force Academy (1972-92) where he was Deputy Department Head (1983-90) and Acting Head (1990-92). Retired from the Air Force as a Colonel in 1992 after some 30 years of service. Since 1978, he has been a member of the Denver Council on Foreign Relations, its president (1993-2003), Vice Chair (2003-17) and emeritus board member (2017-present). Finally, he is also on the Board of Advisors, Inter-University Seminar on Armed Forces & Society, which he joined in 1977. He did his Ph.D.in Political Science, University of California, Berkeley, 1978; MS, International Business Administration, The George Washington University, 1972; MA, Government, Georgetown University, 1967 and BS, International Affairs, U.S. Air Force Academy, 1966. He is awarded with Emeritus Board Member, Denver Council on Foreign Relations (DCFR), "Dedication and Faithful Service" Recognition, Denver Council on Foreign Relations (DCFR). He is a visiting Scholar at Columbia University.

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RECKONING THE PERFORMANCE OF UNITED NATIONS PEACE OPERATIONS: AN EXPLORATION

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Abstract: The concept of United Nations (UN) peace operations evolved as an important instrument to respond to conflicts and civil wars in troubled parts of the world. Many of the peace operations launched over seven decades of its existence has been successful in limiting violence and saving millions of lives. But few of them brought catastrophic consequences and some are dragging on for decades with no end in sight. The principal aim of this study is to analyse performance of UN peace operations with special focus on likely causes of the lapses, and in the light of such lapses, to explore ways to enhance its effectiveness. The major research methods included secondary literature review, documentary research, key informant interviews, and personal observation. Some of the lapses identified in the study are divided consent from lack of comprehensive peace agreement and military centric focus to address root cause of the conflicts. The research argues that there is a need to revisit essential aspects of the peace operations and restrict itself within traditional principles and roles. The research offers some important shifts and practical measures to enhance effectiveness. Main suggestions are fundamental fixes including enhancing training and capacity boosts of UN peacekeepers so that past lapses are not repeated.

Keywords: *United Nations Peace Operations; Achievements; Lapses*

INTRODUCTION

UN peace operations emerged as the doctrine of necessity, designed to restore order amid wave of intrastate and interstate conflicts in the backdrop of World War II. As the European and other colonial powers hurriedly left their colonies in Africa and Asia following the war, many newly independent countries emerged (*Jett, 2019*). These newly emerged nations soon involved in wars between rival factions leading to enormous loss of human lives and sufferings. These countries

and communities needed international engagement short of military interventions to stop fighting and for humanitarian relief. The UN, right after its inception with high hopes, had to act to resolve these conflicts. Peace operations offered an innovative and legitimate option to try a new way of intervention. During the Cold war era, peace operations remained mostly within the domain of traditional monitoring and observation roles and later shifted to multi-dimensional missions. Peace operations consequently evolved as a pragmatic multilateral instrument to respond to conflicts and civil wars in many parts of the world. For the same cause, peace operations became more essential, more desired over other forms of international intervention.

In order to succeed, UN peace operations have to be deployed in support of functional political processes. The same is evident from the impasse in all UN missions that are around for long. Peace operations are best understood through the application of many theories as well as the mandates, roles, and purpose for which the peace operations missions are authorised (*Badmus & Jenkins, 2019*). Scholars favour the 'liberal peace theory' in understanding peace operations due to its allegiance with the post-Westphalian model. Linking liberal peace theory to peace operations, scholars assume that the mounting of peace missions is to serve the interests of liberal democracies by promoting the principles of liberal peace. Experts also observe that the 'Liberal Peace theory' captures the liberal theoretical tradition that motivated the member States to contribute to UN peace operations (*Badmus & Jenkins, 2019*). However, the emerging nature of conflict demanded peace operations to shoulder more and more complex tasks, beyond the security role it habitually performed. The UN and more specifically the peacekeepers' ability to perform those responsibilities at times failed to keep pace, for reasons beyond their power.

Over the last decade, as with the fast-changing nature of conflicts, peace operations had to undertake a 'robust' shift to adapt and to meet the expectations and realities (*Hunt, 2017*). There has been a stark contrast between many of the peace operations interventions as some operations made the UN and international communities gratified. Whereas some operations as in Somalia, relapsed into unimaginable turmoil, and there were genocides on multiple occasions, where the UN have been blamed to have been a bystander (*Bryant, 2015*). The strength and capacity of the peacekeepers vis-à-vis the task and the precarious operational environment has been a mismatch due to financial and operational constraints. More often the UN had to deploy a scanty force amidst challenging environments. A study of accomplishment and disappointments are as such essential to prevent recurring the lapses in any such future endeavour. This study makes a retrospection of UN peace operations and analyses its success and disappointments in dealing with diverse conflicts around the globe.

The paper starts with a brief history of evolution of UN peace operations and then in the second section highlights notable achievements by UN peace operations. Thereafter, in the following sections a quick analysis of lapses by some

of the peace operations, impacts of lack of comprehensive agreements, case of misconduct and related issues are highlighted. Finally, the paper makes an attempt to suggest path to success in UN peace operations.

THE RATIONALE, OBJECTIVES AND METHODOLOGY OF THE STUDY

The study is significant for several reasons: (i) there has been shifts in fundamental principles and role of peacekeepers as well as declining focus on lasting political solutions, (ii) the role and contribution of UN peacekeepers are now clearly recognised, as such any effort to enhance further effectiveness of peace operations is worthwhile, (iii) the study would suggest a set of specific steps to fulfil the commitment in preparing the peacekeepers and to make positive contributions to peace and stability amongst troubled communities. The primary aim of this research is two folds. Firstly, to identify the limits and inadequacies of UN peace operations in managing present-day conflicts and in light of such inadequacies, secondly, to suggest ways that can enable UN peace operations to achieve the assigned mandate. The study also explored measures to enhance effectiveness of UN peace operations.

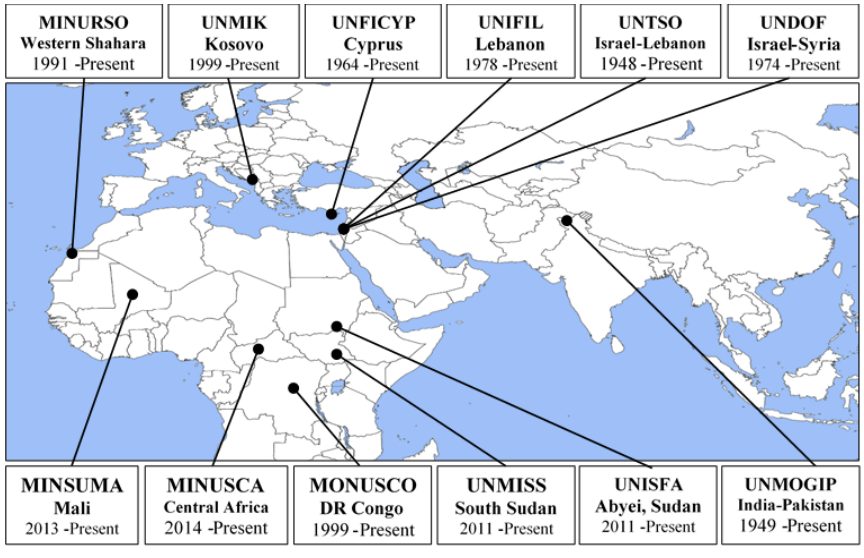
The subject has been explored by applying a mixed method, combining both qualitative analysis and quantitative responses from a field survey amongst practitioners. The study attempted to identify the inadequacies of present-day UN peace operations. In the process of reckoning the lapses, related predicament, and the implications of such limitations have also been analysed. The major research tools included secondary literature review, documentary research, key informant interviews, and personal observation. A comprehensive analysis of literatures including a study of related official documents namely Security Council resolutions and reports, DPO policies and guidelines, training materials including national polices and directives in the conduct of training and preparedness of peacekeepers were carried out. A Good number of key informant interviews were conducted targeting a range of policy makers and experienced peacekeepers that included UN Force, Sector and Contingent commanders, Subject Mater Experts at national peacekeeping training institutes as well as headquarters staffs managing peace operations. The first named author's close personal experience gained during his involvement in couple of UN peace operations, as UN Military Observer, staff officer at the headquarters and long instructional experience at national peace training institute, also informed the observations and analyses presented in this article. The research findings indicate the need for structural fixes and capacity enhancements corresponding to realities in the field. The research recommends fundamental fixes and addressing capacity voids by equipping UN peacekeepers with matching outfit to deal with growing challenges.

EVOLUTION OF UN PEACE OPERATIONS

UN peace operations have evolved as one of the most effective multilateral tools available to international community to help prevent the conflict and pave the way to sustainable peace. The UN General Assembly Resolution 50 (1948) authorised the first ever peacekeeping operations - the UN Truce Supervision Organization, in short, the UNTSO on May 29, 1948 (*UNTSO, 2020*). The resolution called for the end of hostilities between Israel and its Arabs neighbours. May 29th is thus celebrated as the 'International Day of UN Peacekeepers'. This traditional observer mission has been through upheaval in the Middle East following the Arab-Israel wars of 1956, 1967 and 1973. As a first-ever peacekeeping operation, UNTSO was set up with high expectations to make peace between Israelis and the Arabs. Many in the UN visualized and shared such high hopes since 1948. UNTSO remained busy since inception and has been operating endlessly in the absence of a productive solution to the conflicts between state of Israel and its Arab neighbourhood (*Jett, 2019*). The mission continues to function till date. After UNTSO, the second peace operations, 'UN Military Observer Group in India and Pakistan (UNMOGIP)' was authorised on January 24, 1949 by the UN Security Council (UNSC) Resolution 39 (1948) and 47 (1948) (*United Nations, 2020*). The mandate of this traditional operation is to supervise India-Pakistan peace agreement in the state of Jammu and Kashmir. Since the beginning, both Indian and Pakistani military authorities have continued to lodge complaints with the mission for routine ceasefire violations that continue even today. Indian military authorities have restricted the activities of the observers on their side of the Line of Control since long. Yet, the operation continued for over 70 years amid the hotspots of two South Asian nuclear powers. Experts feel that maintaining the status-quo till date can be taken as success of this operation. Critics on the other hand point out that the prevalent status-quo refrained international bodies to seriously engage in the issue and to explore prospects for lasting solution to the Indo-Pak crisis.

UN Emergency Force (UNEF) is the first-ever peacekeeping force deployed amid Suez Canal crisis between Egypt and Israel in 1956. The 1956 crisis started when Egypt nationalized the Suez Canal and the European powers namely Britain and France attempted to intervene. To address the matter, the idea of a peacekeeping force wearing Blue Helmets for identification was proposed during a meeting at the UN on November 4, 1956, by Lester B. Pearson, a Canadian diplomat and later Prime Minister of Canada (*The Canadian Encyclopaedia, 2017*). Pearson had initially proposed Canadian soldiers only, but the Egyptians were suspicious of the concept. Eventually, Mr Pearson came up with the view that the UN peacekeeping force would be constituted from a diverse origin of national forces. This was the first UN led military contingents apart from Military Observers deployed in UNTSO and the concept of peacekeeping force was born. Pearson was later awarded the Nobel Peace Prize for this work. He is also considered as father of the UN peacekeeping operations. UNEF has been a vivid

example of the importance of UN peace operations forces and their limitations. The UNEF accomplished great success and was able to maintain peace in one of the most complex areas of the Middle East (*Jett, 2019*).



Legend:

1. MINURSO - UN Mission for the Referendum in Western Sahara
2. MINUSCA - UN Multidimensional Integrated Stabilization Mission in the CAR
3. MINUSMA - UN Multidimensional Integrated Stabilization Mission in Mali
4. MONUSCO - UN Organization Stabilization Mission in the DRC
5. UNDOF - UN Disengagement Observer Force
6. UNFICYP - UN Peacekeeping Force in Cyprus
7. UNIFIL - UN Interim Force in Lebanon
8. UNMIK – UN Interim Administration Mission in Kosovo
9. UNMISS - United Nations Mission in South Sudan
10. UNISFA- United Nations Interim Security Force for Abyei (Sudan)
11. UNTSO - UN Truce Supervision Organization is an organization
12. UNMOGIP - United Nations Military Observer Group in India and Pakistan

Figure 1. *Ongoing UN Peace Operations (Based on UN Peacekeeping, 2021)*

The Charter of the UN makes no mentions of the peacekeeping or peace operations as the founding members did not foresee any need for such ventures in the post-World War scenario. As such, modern-day peace operations approach is different from the UN roles as envisioned in the UN Charter of 1945 (*Badmus & Jenkins, 2019*). However, the concept emerged with the setting up of the UNTSO in 1948 making the model as old as the UN itself (*United Nations, 2000*). Till date, a total of 71 peace operations have been deployed by the UNSC. Peace operations witnessed a dormant episode and a period of surge with the geo-

political setting and superpower rivalry for last seven decades. Since inception, it transformed from the observations and monitoring of cessation of hostilities and the disengagement of forces in an interstate conflict to full-scale military model. Thereafter, to incorporate multi-dimensional operations involving troop, police and civilian, working together to stabilise and build a war-torn country. There have been enormous shifts since the first peace operation which was set up in 1948 to a full-scale 'peace enforcement' as peacekeepers are now facing international armed groups using terrorists' tactics as the case in Mali and the Central African Republic (CAR).

Present-day conflicts are mostly intrastate and typically occurring within a state that is collapsing or one that has totally failed (*Baker & Weller, 1998*). Amid such setting of poverty and lawlessness, the criminality and gang cultures are widespread. Home-grown and international non-State actors will surely step in the scenario with new methods of terrorism that further complicate the situation. Experts observe that uneven economic development has been the root cause of violence in the contemporary world. Other causes of intrastate conflicts have been the demographic pressures resulting from migration, as it increases population density, and cause environmental degradation, disease and food shortages (*Baker & Weller, 1998*). Failure to resolve this crisis contributes to fears of ethnic reprisals, renewed bloodshed and continuing turmoil throughout the region and even spilling over the continent and beyond. Bringing socio-political stability in such setting has always been the most challenging task the peacekeepers are assigned to address.

Intrastate conflicts are usually extremely difficult to resolve and easy to reappear, due to deep divisions in political, ethnic, religious, and economic groupings. Moreover, continuously evolving threats with new tactics and techniques transformed in scale and scope of today's peace operations. Internationalization of local war as transnational illicit group joining the factions has been another impediment. Moreover, warlords and factions are interconnected with organised crimes and international terrorism network. The economic downturn from COVID-19 pandemic may further complicate the situation and act as a catalyst for more decline. Victims of these new warfare has been predominantly the civilians, not the combatants. This necessitates a response across the full spectrum of political, economic, social, development, military, humanitarian, etc. (*Baker & Weller, 1998*).

NOTABLE ACHIEVEMENTS

Since the modest start in 1948, the UN has been successful in resolving conflicts conducting effective peace operations in dozens of countries. Undeniably, UN peace operations have been successful in prevention of large-scale violence, ending some of the most horrific conflicts, enhanced civilian protection and security of female children in many troubled counties and communities (*Coning, 2019*). Three

significant UN undertakings studied by 'Effectiveness of Peace Operations Network (EPON)', an independent expert body that studies peace operations, rated the African Union Mission in Somalia (AMISOM), the MONUSCO, and MINUSMA. EPON observes that these missions have made significant contributions to preventing major civil wars and large-scale conflict (Coning, 2019). Analysis of MONUSCO, MINUSMA, UNMISS, and AMISOM suggests that peacekeepers might not have been able to bring about an end to violent conflict, but its work in areas such as child protection, human rights, and sexual violence are commendable. Other peace operations, such as in Côte d'Ivoire, Liberia, Sierra Leone, and Timor Leste, etc. have been able to wrap up after successfully implementing mandates assigned by the UN Security Council. In sub-Sharan Africa, a range of conflict resolution, good offices, and local peace initiatives have made a notable contribution to preventing violent conflict and reducing risks to civilian lives and livelihood (*Coning, 2019*). Experts also rate peacekeepers' effort to promote the Women, Peace, and Security agenda to have made some degree of progress.

Peace operations in Cambodia, El Salvador, Guatemala, Mozambique, Namibia, Tajikistan, and Liberia are considered to have been successful in saving lives, bringing security and political stability (*UN Peacekeeping, 2020*). Researchers consider the complex multi-dimensional operations in the 21st century in countries like Sierra Leone, Burundi, Ivory Coast, Timor-Leste, Liberia, Haiti, and Kosovo as peace operations triumph. The UN, in these recent peace operations, have been able to stabilize precarious security situation, supported humanitarian relief and helped conduct successful elections, enabling peaceful transitions. Moreover, one of the UN's most complex and successful interventions in peacekeeping and peace-making efforts in Central America in 1989, the UN Observer Group in Central America (ONUCA) has been a huge success (*Department of Public Information, 2003*). The UN assistance to the collective agreement steered a new nonviolent era in Central American countries of Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua have been widely admired as a success.

The UN Transitional Authority in Cambodia (UNTAC) has been acknowledged as an enormous accomplishment of UN peace operations. UNTAC was successful in organizing nationwide free elections that established a new government following the vacuum left by the Khmer Rouge regime. The UN role and accomplishments in Haiti has been a notable success, where the UN had to setup numerous overlapping and concurrent peace operations since 1993 (*Jacobson, 2012*). Experts also grade the UN Emergency Force II (UNEF II) as a success as it could maintain peace along the most volatile border between Egypt and Israel. The mission in Liberia was an accomplishment for the UN that started in September 2003 and ended with much sought about stability in the country in 2018. The UNOCI in Ivory Coast has also been viewed as an achievement given the fact that multiple peaceful transition of power occurred between elected administrations through UN electoral assistance.

RELATIVE LAPSES

The report by the panel led by Mr Lakhdar Brahimi (Brahimi Report) observed that the UN failures to distinguish victim from aggressor damaged the stature and credibility of UN peace endeavour in the 1990s (*United Nations, 2000*). Following the catastrophe and deaths of thousands in Somalia, the 'UN Commission of Inquiry' investigating peacekeeping debacle determined that the UN should avoid deploying peacekeepers for the peace enforcement actions to deal with internal conflicts (*Williams, 2015*). The high-level panel headed by Mr Hose Ramos Horta urged to focus more on political solution rather than military outcome of the conflicts (*High Level Independent Panel on Peace Operations, 2015*). Experts observe military centric focus in dealing with situations in most peace operations and views that emphasise on defeating armed elements militarily may not help bring lasting pace. The root cause of the conflict is political and finding a lasting solution acceptable to all the stakeholders will continue to remain a challenge in the days ahead. Some of the peace operations' lapses and concerns are discussed subsequently.

Rwandan Genocide: The unforgiveable mass murder of Hutus in Rwanda cast a dark shadow on the peace operations achievements. The escalating tensions between parties in the conflict, in Rwanda was ignored by the UN Canadian Force Commander and other UN representatives (*Winfield, 1999*). Various reports confirm that peacekeepers failed to assimilate the severity of the viciousness and thereby failed to stop the violence that resulted killing of about 800,000 Hutus including Tutsi and sympathetic Hutus in just 100 days in 1994 (*BBC, 2014*). The UN leadership in Rwanda and in New York had ignored signs that the genocide was in the making. A Belgian contingent of UN Assistance Mission for Rwanda (UNAMIR) is blamed to abandon thousands of people at a school, who sought refuge at the vicinity of peacekeepers camp. Instead of saving lives, the peacekeepers were asked to vacate the position to escort visitors to the airport (*McGreal, 2015*). About 2,000 Rwandan citizens at the school were murdered within hours the soldiers left, using guns, grenades, and blades. Researchers view the episode with UN peacekeeping Rwanda as not an isolated one. In the following year, UN peacekeepers from the Netherlands failed to stop the carnage of eight thousand Muslims in Srebrenica, Bosnia at a UN Safe Area. It was the most infamous mass slaughter by the Serbs in Bosnia. (*McGreal, 2015*) These episodes bear the evidence of terrible catastrophes at a time when UN had vast growth in peace operation during the post-Cold War surge.

Srebrenica Massacre: In Bosnia Herzegovina, the UN peacekeepers were deployed at posts to protect civilians in several 'Safe Areas' around Srebrenica in 1995. The forces were mandated by the Security Council to deter attacks and use forces in the defence of the mandate. Most Bosnian citizens deposited their guns as pledged in the agreement and were unarmed in July 1995. Serb forces took advantage of the situation and brutally killed about eight thousand Muslims men and teens within two weeks (*BBC, 2020*). Studies identify it as the worst mass

slaughter on mainland Europe after World War II. Moreover, in early July 1995, the UN Protection Force (UNPROFOR) peacekeepers from the Netherlands declined to return their guns back to the Bosnian Muslim communities even after they were facing attacks by the Bosnia Serb Army (*New York Times, 1995*). Commander of the Dutch contingent cited to have thought that the Bosnian citizens were unable to defend Srebrenica. The peacekeepers also assumed that they would not be effective to protect the civilians either. As such, UNPROFOR forces refrained to take steps to counter the Serb militia by not firing a single shot and vacated their posts. Eventually, the horrific slaughter of Muslim men and boys, and women and children took place in Bosnia unabated. The massacre of innocent civilians occurred within the so called 'safe areas' declared by UN peacekeepers. Mr Kofi Annan later commented that, "The tragedy of Srebrenica will forever haunt the history of the UN" (*BBC, 2020*).

Failure in Somalia: In Somalia, the UN peace operations failed miserably, resulting first in the tragic deaths of 25 Pakistani soldiers. The incident followed the death of eighteen U.S. soldiers. In that, horrific images of mutilated soldiers dragged on the Mogadishu streets shocked the world (*Gettleman, 2007*). Mandates in UN Operation in Somalia (UNOSOM II) mission were unrealistic, especially given the operating environment resulting from lack of consent for the peace operations. Though the mission had huge authorisation of personnel strength, but it lacked military enablers and specialized capabilities (*Williams, 2015*). Another gross miscalculation has been the employment of the lightly armed peacekeepers to conduct large-scale enforcement actions. Ambitious venture to disarm the unwilling factions, and later to capture General Mohammad Aidid, have been the most unrealistic expectation on the part of UNOSOM II. Consequently, the UN acknowledged that the organization was not yet capable of launching a large-scale enforcement action. The crisis in Somalia has been political and addressing the root cause required different approach. Whereas the operation focused on humanitarian aid during the conflict without resolving the dispute. Failure of the two operations in Somalia resulted hasty withdrawal of the peacekeepers in 1995 and the crisis remained unresolved till date. The crisis in Somalia further escalated thereafter that continue to trouble the people in Somalia and the region.

Lack of Comprehensive Peace Agreement: Experts feel that since 1990, most peace operations have been deployed where the conflict is unfinished and without any comprehensive agreement between the parties. Particularly, UNTSO, the first UN peacekeeping mission that began in May 1948 and continue even today and none is aware of its culmination. Six of the ongoing thirteen peace operations in 2021, are traditional peace operations and three of them are in and around Israel. All UN traditional peace operations lacked any exit strategy. The same was observed by the Brahimi Report. The report also notes that the classical monitoring and observation missions were mostly ineffective as it deals the symptoms rather than the origin of the hostilities. Besides, the UNTSO in Jerusalem, the UNDOF in Syria, UNMOGIP in Indo-Pak border and the

UNIFIL in Lebanon continue to linger on today (*Jett, 2019*). Main reasons these peace operations dragging on endlessly is the lack of common ground between the belligerents' claims. In most cases, the stand-off is more preferred over righteous solutions. The status quo in UNMOGIP, the second oldest operations also facing endless deadlock as both countries have shown no desire to settle their conflicting claims as such continuation of mission suits both the parties.

Political Standoff: As discussed previously, half of the ongoing peace operations have been toiling around as there are no sincere steps to address the issue and find a lasting political solution (*Jett, 2019*). The same has been the case for UNIFIL in Lebanon, UNFICYP in Cyprus and UNMOGIP in India-Pakistan. All the traditional peace operations currently underway including the MINURSO in Western Sahara are seemingly endless as UN could not find a meaningful political outcome. The case in Western Sahara is all about arranging a credible referendum of the Sahrawi inhabitants in addition to other mandated task to oversee the security situation, that does not suit Morocco as it declines to hold the referendum without being sure of the favourable outcome *(Theofilopoulou, 2015*). Morocco's approach has been the same since the initiation of MINURSO mission. The same has been the case for UNIFIL in Lebanon, UNFICYP in Cyprus and UNMOGIP in India-Pakistan. As observed in the recent peace operations in Sub-Saharan Africa, political process without encompassing all parties involved can also lead to more disorder rather than resolution of the root cause of the conflict.

Allegations of Misconduct: Sexual exploitation and abuse prevail in all operations despite vigilance and enactment of abundant stricter policy measures on all related issues by the UN. Unfortunately, whom civilians' believed to have been sent to protect them, are also accused of exploiting their women and girls causing serious embarrassment (*Jacobson, 2012*). As a matter of principle, the UN maintains a 'Zero Tolerance' policy at its headquarters and in all field missions. However, implementation is at times stalled due to the absence of accurate and timely reporting of data and by enforcement responsibility dedicated to the troop and police contributing states (*Jessica Anania, 2020*). Studies indicate that in February 2020 there has been 43% rise in allegations compared to 2018-19 (Figure 2). The report by the high-level panel headed by Mr Hose Ramos Horta, said that the UN troop scandals were the worst thing that can happen to the UN, which will take enormous efforts to overcome this dark chapter)*The United Nations, 2015*(. Shockingly, a third of sexual abuse allegations against UN personnel involved children and teenagers under eighteen *(United Nations News Centre, 2015*). In a report to General Assembly the UN Secretary General mentioned that most (74%) of the abuse occurded with missions in DRC and CAR in 2018. Whereas, rest 36% was reported from missions in Haiti and South Sudan *(UN Seceretary General , 2020*). Secretary General Guterres has assured that he has launched numerous steps and reforms to expediate legal process by appointing a victims' advocate to help the sufferers (*Lederer, 2020*).

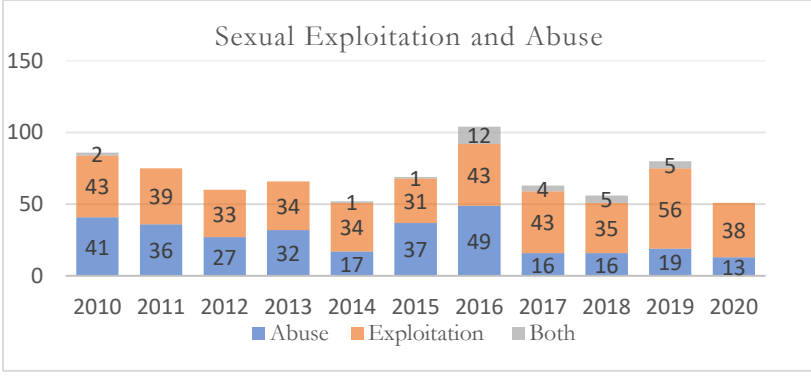


Figure 2. *Sexual Exploitation and Abuse in Peace Operations: 2010 – 2020 (Based on Conduct in the UN Missions, 2021)*

Haitian Cholera Deaths: An outbreak of cholera in Haiti in 2011 killed over 10,000 people that created a serious embarrassment for UN Peacekeepers. Genomic investigations of the Haitian cholera bacteria showed that a Nepali peacekeepers camp were responsible for introducing the bacteria through a flawed sanitation system that emptied sewage into the river. High-level denial of any involvement or responsibility of the Nepali contingent in the incident has been another UN setback in the recent past (*Katz, 2016*). The UN refused to acknowledge responsibility fearing the huge backlash on legal and moral impact on peace operations. Therefore, it relentlessly pursued to be indicated in the case at the U.S. Lawsuit to avoid being implicated for payment (*Jett, 2019*).

Other Issues: African conflicts in general are fuelled by the access of precious metal that can draw external actors to interfere and protract the fighting *(Ian Bannon, 2003*). The issue at times is not addressed in the mandates of most ongoing peace operations, which has been a cause for concern. Armed group's ability to make fortunes are likely to be threatened by an end to exploitation of vital natural and mineral resources. Moreover, there have been international involvement in the intrastate conflicts with diverse interests coming into play. Lack of physical presence of peacekeepers from the Western nations has been obvious that hampers political commitments and needs to end sooner.

PATH TO SUCCESS

There are numerous studies and varied opinions suggesting how present-day peace operations may succeed in resolving conflicts and saving lives and livelihood of millions of innocent civilians caught up in the conflict. Though hard to achieve, but experts widely suggest that a comprehensive peace agreement is an essential precondition for success of any peace operation. As outlined in the first of the three fundamental principles, the 'Consent' of all the parties is vital

starting point for any peace operation. Besides Consent, peace operations must stick to the tested principles and remain within the essence of the other principles of 'Impartiality' and 'Non-use of force except in self-defence or defence of the mandate'. However, the challenge is to engage with armed groups with record of brutalities and grave human rights violations. The high-level panel headed by Mr Hose Ramos Horta also recommended to focus more on political solution rather than military outcome of the conflicts. Experts observe military centric focus in dealing with situations in most peace operations and views that emphasise on defeating armed elements militarily may not help bring lasting peace. The root cause of the conflict is political and need a lasting political solution to resolve the conflict. Renewed focus is also required on peace-building effort involving populations so that local ownership is felt by the communities.

Being organised and armed not to conduct distinctive military operations, the peacekeepers are no way capable to decisively engage in combat and win in the long term. For the same reason peacekeeping forces are not competent to undertake counterinsurgency like operations against rebels or peace-enforcements roles as observed in the long-drawn conflicts. Peacekeeping forces are traditionally called in following a peaceful negotiation or as a sequel of agreement following peace-enforcement actions sponsored by the UN Security Council (UNSC) and by forces of any regional power or an alliance. There are many such successful models where the regional forces fought their way in an ongoing conflict leading to a truce amongst parties and then handover peacekeeping roles to UNSC authorised force to implement the peace agreement. The same model has been successful for decades, whereas peacekeeping forces switching gears to undertake peace-enforcement in the absence of peace or collapse of truce has not been working well. Experts thus recommend leaving the peace-enforcement roles to regional power or an alliance to intervene in the conflict in the absence of peace and peacekeepers operate fully within the boundaries of the principles and mandates of peacekeeping. Such setting in West Africa and in the Balkans, where French, ECOWAS or NATO forces executing peace-enforcement have been effective in the recent past. Involvement of regional powers in some form of operational relationship with peacekeeping mission is essential and such operational relationship need to be authorised by the UNSC.

Numerous UN internal reports points on the compromise of desired standard of the peacekeeping troops and contingents from member states. Lack of required training to deal with diverse threats from armed group using suicide tactics and Improvised Explosive Devices (IED) continue to hinder performance of peacekeepers. The UN and member states need to deploy well-trained and duly verified contingents to operate not only to perform mandate effectively but also to ensure own protection. 'Chapter VI' syndrome resulting defensive posture, abandonment of initiative, hindrance to freedom of movement, and slow response to hostile actors results from inadequate training and preparation. IED threat mitigation capacity in CAR and Mali needs to be addressed by suitably

quipping the contingents. UN Department of Peace Operations (DPO) and the contributing countries also need to address inappropriate and inadequate equipment to the threat environment, terrain and weather including associated logistical backup. Random downsizing mainly due to financial constraints resulted overstretched deployment that compelled contingents to dedicate maximum operational capacity for escort and self-protection. This has seriously reduced Infantry contingent's capability to respond timely to ensure protection of civilians. Moreover, while authorising mandates, the UNSC need to focus on allocating appropriate resources in terms of strength, mobility, and protection equipment so that the task is realistic and achievable. Moral and ethical issues relating to sexual exploitation and abuse remain a challenge despite 'zero tolerance' at all levels. In addition to measures already in place, more vigilance and speedy disposal of disciplinary actions may help improve the situations.

CONCLUSION

UN peace operations have accomplished enormous responsibility in saving human life and sufferings in the most remote communities and helped nations to exit cycles of violence. The triumph over seven decade's active presence and being bestowed with the 'Nobel Peace Prize for Peace' is an incredible achievement for UN and the contributing nations. Despite criticism, for grave failures mostly during the expansion phase post-Cold War setting, peace operations served as the most pragmatic method to deal complex emergencies emerging from conflicts and calamities. Given the complexity of the precarious political setting and involvement of international armed groups adopting means of terrorism, the hurdles for peacekeepers will continue to grow in the days to come. The quality of troops and contingents has been an old issue affecting the performance of peace operations. The DPO needs to enhance measures to ensure its best practices in terms of policies, guidelines and oversight on conduct and discipline. Experimenting with peace enforcement roles by peacekeepers are against the fundamental principles that the peace operations came into being, needs a rethinking. The UN also need to balance the resources against attainable mission mandate to make the peace operations effective.

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THE MISSION WORTH STRIVING FOR: A REALIST'S APPROACH TO HOIST BANGLADESH'S NATIONAL FLAG IN ANTARCTICA

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Abstract: Reality emphasizes that nation-states are fundamentally driven by national interests to secure political autonomy and territorial integrity. Once these interests are preserved, national interests may take different forms such as acquiring more resources, mitigating existential climate change challenges. Climate experts posit that climate change impacts pose a formidable challenge to Bangladesh's development efforts, human security and the future. Thus, this study analyses whether national interest of acquiring additional resources vis-à-vis comprehensive environmental protection is a better option for sustainable development in Bangladesh. Specifically, it examines whether entering into an agreement with the 'Antarctic Treaty Nations' would be at a premium for Bangladesh's quest for developed status. This analytical research is based on primary and secondary sources. Most of the data are qualitative and descriptive method has been applied. The result suggests that Bangladesh needs to strategize future endeavors balancing between harnessing additional resources while dealing effectively with climate change. On this basis, before Bangladesh's leadership react to the realities of nature against rising waters due to global warming, it is imperative to know about the Antarctic, which remains, for many a 'terra incognita'. It is to provide strategies for Bangladesh's admission into the elite club of the 'Antarctic Treaty Nations'. It is also to initiate creative contemplation among academia and practitioners alike to acknowledge the importance to hoist Bangladesh's national flag in Antarctica as a symbol of national pride, prosperity, and commitment to 'ensure bright future for generations to come'. Moreover, what could be the most befitting date to boost the process and set the declaration to hoist the flag in Antarctica than the '*Mujib Barsha*' Centenary celebration?

Keywords: *Antarctic; Climate Change Challenges; Development; Realism; Strategy.*

"In sha Allah, we will build the Bangladesh that was the dream of the Father of the Nation. That is our conviction."

Sheikh Hasina, Hon'ble PM

INTRODUCTION

In the twenty-first-century geostrategic scenario, generally speaking, geopolitics through geographical factors like climate and access to natural resources, shape international relations. As Tim Marshall (*2015, p.2*) opines, "there is no one geographical factor that is more important than any other". As global warming and climate change victim, Bangladesh is one of the most vulnerable countries. Bangladesh cannot be blamed for its topographical location in the Bengal delta with a low elevation from sea-level, where floodplains dominate the country. (*Haas, 2020, p. 110*). Like any other nation, it has the natural right to have access to nature and benefit from its resources. It may not be wrong to assert that it is incumbent upon each citizen to join, even in harm's way' to save the country's attained development to pave the way to its aspired voyage towards developed status in 2041. Furthermore, in doing so, one needs to be alert, especially about the issues that threaten our human security due to permanent inundation and sea-level rise causing erosion of national assets, investment and the lofty future.

Looking to the future, geopolitics affects every country, whether at war or peace or whether it is for a developing nation or a developed democracy. "Every geopolitical vision or theory claims to be realist and objective"(*Gökmen, 2010, p. 68*). In order to paraphrase Napoleon, it can be argued that states follow politics to maximise their national interests as dictated by their geography. Thus, there had always been a symbiotic relationship among national interest, diplomatic history and geography. Bangladesh's geography, to put it simply, is its map. It implies that, like many countries, Bangladesh is also a prisoner of its geography irrespective of its size and wealth. After all, "the world history is the story of competing authorities over the power to organise, occupy, and administer space" (*Toal et al., 1998*). Nevertheless, where does Bangladesh fit into this equation? Where should a Bangladeshi policymaker look at in determining Bangladesh's grand geopolitical strategies vis-à-vis its aspiration?

For most of Bangladesh's history, the Antarctic is ignored. It is very well-known that the Antarctic is a reservoir of resources and a dominant actor responsible for global climate change. Thus, there is a substantial possibility that twenty-first-century realpolitik of the Antarctic will determine who administers and acquires resources and react timely to the harsh realities of nature. For this brief research study, Antarctic and Antarctica are not synonyms; the first is related to the region in the Earth's South polar zone while the latter refers specifically to the continent itself. Figure 1 will clarify the difference.

Furthermore, the first maritime boundary dispute in the Bay of Bengal (BoB) between Bangladesh and Myanmar was resolved in 2012 by the International

Tribunal for the Law of the Sea (*ITLOS, 2012*). The second dispute between Bangladesh and India was resolved by the Permanent Court of Arbitration (PCA) in 2014 (*PCA, 2014*). The first satellite, Bangabandhu Satellite - 1, was successfully launched in 2018, where the Government of Bangladesh has planned to set a target for launching a second satellite, Bangabandhu Satellite - 2, to the orbit by 2023 (*Bangla News 24, 2020*). Thanks to the prolific visionary leadership of Prime Minister Sheikh Hasina, decades-old maritime boundary disputes were amicably resolved in our favour through two international arbitrations. Bangladesh has become a member of the elite club of only 57 states that own at least a satellite and the country is marching forward on the highway to development to become a role model for the developing world.

Therefore, given the firm commitment by the Honourable Prime Minister to fulfil the dream of the Father of the Nation Bangabandhu, a patriotic and a realist citizen can enthusiastically expect that the country will celebrate her 70th Independence and National day as a developed nation in 2041. As 'ideas are bulletproof', the declaration to hoist the flag in Antarctica could be made during the celebration of the *'Mujib Barsha*' Centenary. Given the context of successful accomplishments of a series of missions by the current government, this author postulates that the nation must strive for yet another mission, which is of vital strategic national interest" to hoist Bangladesh's national flag in Antarctica well before 2041. It is to be raised as a symbol of Bangladesh's pride, prosperity and commitment to effectively engage, "so that we may prosper in freedom and may make our full contribution towards international peace and cooperation in keeping with the progressive aspirations of mankind" (The Constitution of the People's Republic of Bangladesh, Preamble, 1972).

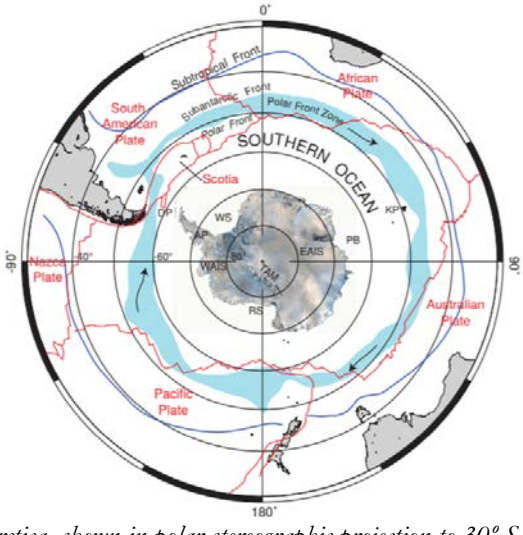


Figure 1: *Antarctica, shown in polar stereographic projection to 30° S. Surrounding plate boundaries are outlined in red, and major oceanographic boundaries in blue (Oxford Handbooks Online)*

CONCEPTUAL FRAMEWORK

The conceptual framework of this study is expressed using a radial cycle – as it is demonstrated in Figure 2. As of other nations, embracing the fact that we live in a realist's anarchic world, Bangladesh has the natural right to maximise its national interests to rise and strive for excellence. Thus, the central idea of the research is 'A Realist's approach to Hoist Bangladesh's National Flag in Antarctica'. The central idea is reinforced by five outer rings: the first one aligns with the conceptual compass about 'Understanding the Antarctic and Evolution of Its Treaty System'; the second ring deliberates on 'Interpreting Realist's Paradigm: National Interest Demands Comprehensive Environmental Protection' for Bangladesh; the third ring investigates whether 'Will it be a Premium: Entering into the Antarctic Treaty System' for Bangladesh's quest for developed status; the fourth ring emphasises on suggesting 'Strategic Antarctic Research Priorities for Bangladesh' in connection to the central idea. Reflecting on the central idea based on the answer of the research question and the realisation of objectives, the fifth ring concludes by making a couple of relevant recommendations.

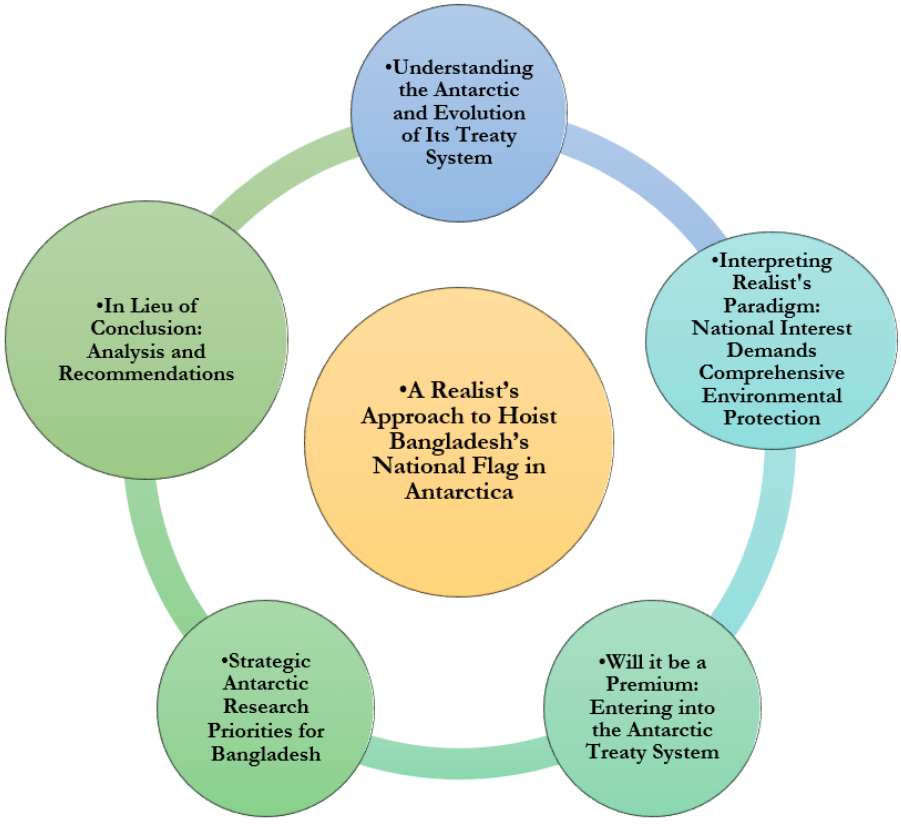


Figure 2: *Radial cycle depicting conceptual framework of the study as contemplated by the author*

RESEARCH QUESTIONS VIS-À-VIS OBJECTIVES

Research Questions

1. How national interest in acquiring additional resources vis-à-vis comprehensive environmental protection is a better option for sustainable development in Bangladesh?
2. How does entering into an agreement with the 'Antarctic Treaty Nations' offer a premium for Bangladesh's quest for developed status?
3. Why is it imperative for Bangladesh to understand and participate along with the other 'Antarctic Treaty Nations' in substantial scientific research, specifically to conserve existing resources, acquire more resources, and to secure comprehensive environmental protection?
4. What strategy could enable Bangladesh's admission into the elite club of the 'Antarctic Treaty Nations'?
5. How to initiate creative contemplation among academia and practitioners alike to acknowledge the importance to hoist Bangladesh's national flag in Antarctica as a symbol of national pride, prosperity and commitment to 'ensure bright future for generations to come'?

Research Objectives

1. To analyse national interest of acquiring additional resources vis-à-vis comprehensive environmental protection for Bangladesh.
2. To investigate the entry into an agreement with the 'Antarctic Treaty Nations' for Bangladesh.
3. To suggest strategic Antarctic research priorities for Bangladesh.
4. To highlight salient points for Bangladesh's Antarctic policy.
5. To make pertinent recommendations for implementations.

METHODOLOGY

This analytical research article makes an endeavour based primarily on secondary sources related to the study of the topic, and on the author's interviews of two Brazilian naval officers who, for almost a year, served in the Antarctic. Most of the data collected for this research are qualitative. The descriptive method has been applied, albeit after the review of the literature, firstly to understand the nitty-gritty of the Antarctic. Thereafter, the study includes interpretation of the realist's paradigm to attain sustainable development, national interest demands comprehensive environmental protection for Bangladesh. Before emphasising a few suggestions regarding strategic Antarctic research priorities for Bangladesh, an investigation is made as to whether entering into an agreement with the

'Antarctic Treaty Nations' offers an advantage for Bangladesh's quest for developed status. As a corollary, finally, some pertinent recommendations for implementations are made.

LITERATURE REVIEW

Ross Cullen (*1994, pp. 143-155*) of the Department of Economics and Marketing from the Lincoln University, Canterbury. New Zealand, opined that the Consultative Parties to the Antarctic Treaty agreed in October 1991, subject to ratification on an Environmental Protocol which will preclude mining in Antarctica for 50 years. The initiative to preclude the exploitation of Antarctic mineral resources due to the concern about possible environmental damages associated with mining. The author considers that the extraction of Antarctic minerals may currently be unprofitable but become economically significant in the future.

Williams and Crosbie (*2007*) in an article titled 'Antarctic Whales and Antarctic Tourism', mention that 'careful management and dedicated research' are required to ensure that the rising Antarctic marine tourism industry does not unintentionally harm the whale populations. They also discuss that ongoing research by the International Whaling Commission (IWC) aims to monitor whale population recovery, and the International Association of Antarctica Tour Operators (IAATO) has developed operational guidelines to minimise and mitigate potential impacts on the Antarctic environment.

Kuhn et al., (*2010, pp. 67-84*) believe the ice sheets are likely to be responsible for regional in addition to global variations in sea level rise through direct gravitational attraction of the water mass.

Siegel, V. et al., (*2013, pp. 63-74*) speak of the distribution and abundance of Antarctic krill along the Antarctic Peninsula. They contend that due to the rapid climate changes across the Peninsula and lower per capita recruitment, production, growth etc., will be critical in understanding how climate change will impact Antarctic krill populations as well as their dependent predators.

The Antarctic continent has a significant influence on global climate and ocean systems argue Fretwell et al., (*2013, pp. 375-393*). According to them, variations in the volume of the ice sheets affect the rise of sea level by seizing water on land: the current volumes of the East and West Antarctic Ice Sheets correspond to around 53 and 4 meters of global sea-level rise, respectively.

In the Financial Times, Leslie Hook & Benedict Mander (*2018*) write on the topic 'The fight to own Antarctica', that "competition for natural resources, research and tourism is putting pressure on the cold war-era treaty that guarantees order on the continent".

Referring to Dr Alessandro Antonello, Needham (*2019*) argues that it is through the geopolitical contest that followed the signing of the Antarctic Treaty. Thus,

Antarctica's concept has changed immensely over the years since the signing of the Treaty. Presently, it demonstrates a 'complex interaction between global politics and the natural world'.

On the 15 May issue of 'The Atlantic', Leah Feiger & Mara Wilson (*2020*) assert that theoretically the Antarctic Treaty System governs Antarctica in their paper entitled 'The Countries Taking Advantage of Antarctica during the Pandemic'. However, according to Klaus Dodds (*Feiger and Wilson, 2020*), a geopolitics professor at Royal Holloway, University of London, "one of the things that people quickly recognised in Antarctica is that place names and boundary drawing have an extraordinary significance in a place where all the normal indicators of ownership don't apply". Despite geopolitical strains, Feiger & Wilson opine that Antarctica remains a place that sees a "high degree of scientific collaboration". But, according to Dodds (*Feiger and Wilson, 2020*), "it also enables you to be nasty. It enables you to be obstructive, petty, and vindictive".

UNDERSTANDING THE ANTARCTIC AND EVOLUTION OF ITS TREATY SYSTEM

To answer the question as to why it is imperative for Bangladesh to understand and participate along with the other 'Antarctic Treaty Nations' in substantial scientific research, specifically to conserve existing resources, acquire more resources, and to secure comprehensive environmental protection – Bangladesh, as a founding block, at first need to understand the Antarctic.

Scientifically, yet very briefly speaking, it is claimed that Antarctica was framed from the breakup of Gondwana. Two hundred million years ago, the study says, Antarctica was the centre of the Gondwana supercontinent consisting of today's Africa, Antarctica, Australia, India and South America, according to what may be seen in Figure 3. Interestingly, it was not the frozen continent as we know it today. About 180 million years ago, the movement of lithospheric plates, resulted a hot megaplume that caused the formation of Gondwana to begin to break apart. (*Storey & Kyle, 1999*). It is in these tectonic phases, the Antarctic plate gradually moved southwardly toward the polar latitudes. (*Di Venere et al., 1994*). This is believed to have set the scene for the creation of continental glaciation (*De Conto & Pollard, 2010, pp. 245-249*). Very important for us today is the knowledge that the glaciation affected the global climate, sea levels, ocean circulation, and atmospheric composition and dynamics leading to the present cold polar climate.

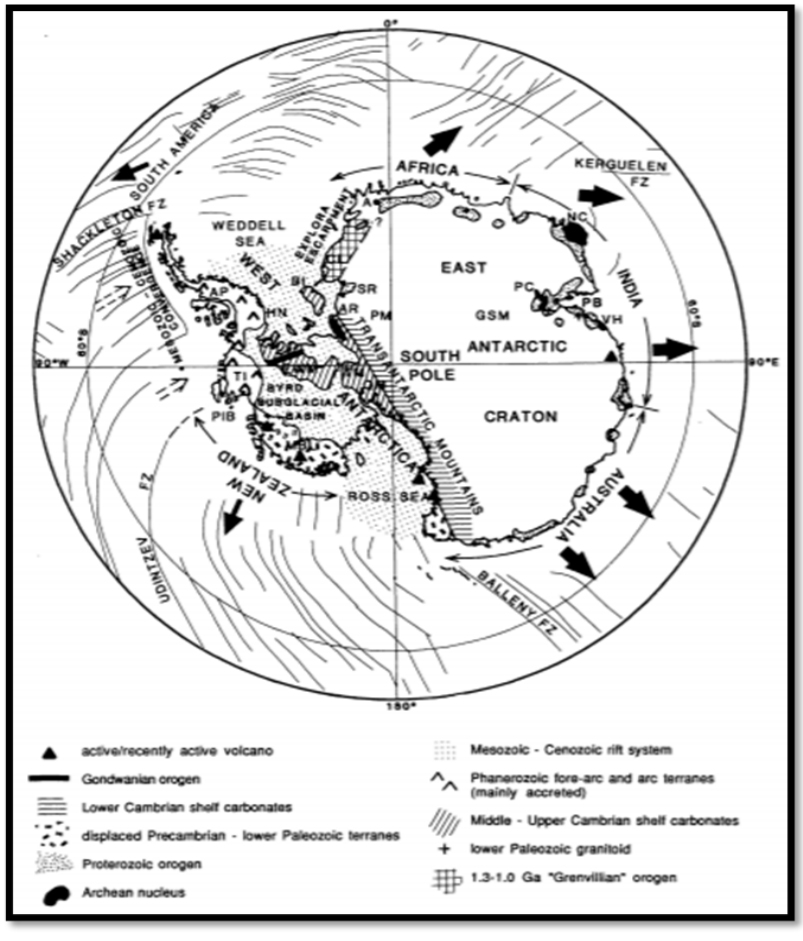


Figure 3: *Simplified tectonic map of the continent Antarctic and surrounding oceans basins (Dalziel 1991, Tingey 1991, Royer et al., 1990)*

Antarctica is the opposite of the north. It is also believed that about 2,000 years ago the Greeks thought that to counterbalance the north, something similar must exist in the south. Antarctica is a continent surrounded by water. The average temperature at the South Pole during the coldest month of September is minus 57ºC. Since 98% of Antarctica is permanently covered in ice and has a colder climate, there are only two species of flowering plants that grow in Antarctica, as well as 50 mosses and 200 lichens. (*Scenic, 2019*).

The primary difference between the Arctic and Antarctica is geographical. The Arctic is an ocean, covered by a thin layer of perennial sea ice and surrounded by land. Antarctica, on the other hand, is a continent, covered by a very thick ice cap and surrounded by a rim of sea ice and the Southern Ocean. Although the impact of climate change and the Arctic are discussed often in the media, climate change

in the Antarctic is comparatively neglected, or reported misleadingly. (*NASA, 2019*).

In 1950, Thomas R. Henry, an American journalist wrote: "A dead continent lies swathed in a mile-thick shroud of ice at the bottom of the world". His book, "The White Continent: The Story of Antarctica", seems to be a good starting point for understanding Antarctica. The author accompanied a large U.S. Navy fleet commanded by Admirals Richard E. Byrd and Richard H. Cruzen in their Antarctic High Jump Expedition of 1946-47. The Task Force 68 included 4,700 men, 13 ships, and many aircraft. The effort was to establish the Antarctic research base Little America IV. It was one of the five bases, which were called Little America, that Admiral Byrd set up on the Ross Ice Shelf from 1929 to 1956. (*Walker, 2011*).

In 1959, twelve countries accorded the Antarctic Treaty. Neither Admiral Byrd nor journalist Henry could know in 1946 that Antarctica would be under such regulations setting a status quo on territorial claims. Basically, the aim of the Antarctic High Jump Expedition was to extend and consolidate U.S. sovereignty over the useful area of Antarctica, though the objective was denied publicly. There were reactions from other states that had their own stakes. For instance, Chile, in the next southern summer, when weather-wise it was possible to carry out a full operation in Antarctica, established its first permanent Navy base named "Capitán Prat", in Antarctica in 1947, followed by another Army base "General O'Higgins" in 1948, followed by yet another base in 1949. The Chilean government reaction aptly demonstrated that the issue of Antarctica was a geopolitical one; thus, it was about sovereignty. Chile, therefore, till date, claims its historical rights over the Antarctic territory citing its proximity, effective occupation and of course the right of exploration. (*Walker, 2011*).

Although the Greeks conceived a sixth continent, which should have been similar to the Arctic because the world was to be symmetric) only in the 15th century vessels capable of navigating for a prolonged time were built. It was the age of Columbus, Vespucci, Magellan and other great European explorers. Three centuries later, at the end of the 18th century, the Antarctic Circle was crossed. Seal and whale hunting soon became a significant economic activity. The first confirmed discovery of Antarctica was only in 1820. The first time the continent was circumnavigated was between 1830 and 1832. Flourishing scientific expeditions of the continent began by the late 19th century. These expeditions triggered the process of sovereignty claims. In the history of the Antarctic, there has always been a trade-off between science and geopolitics. For example, the first such action was in 1893 of the French annexation of the Kerguelen Islands. Followed by claims over portions of the continent from England, New Zealand, France, Australia, Norway, Chile and Argentina. (*Walker, 2011*).

Following the 2nd WW, overlapping claims made by competing nations such as Chile, Argentina and Great Britain as well as increased geostrategic interests of the Antarctic of the United States and the Soviet Union. More importantly, the need to guarantee free passage between the Atlantic and the Pacific Oceans led

to a tense situation. Though organising the International Geophysical Year (IGY) 1957-1958 was apparently aimed at the Antarctic scientific research, it was in reality, impregnated with geopolitics. However, it managed to scale down the tension and contributed to give birth to the 1959 Antarctic Treaty. The seven states demanding eight territorial claims are Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom. Norway claims two territories: Peter I Island and Queen Maud Land. Other five participants, the original members of the Antarctic Treaty of the IGY were Belgium, United States, Soviet Union today's Russian Federation, Japan and South Africa. However, other countries do not recognise any such claims. The Russian Federation and the USA maintain a "basis of claim". Since 1959, apart from the 7 original claimant and 5 participants in the IGY, 42 other countries have acceded to the Treaty. According to Art. IX.2, they are entitled to participate in the Consultative Meetings during such times as they demonstrate their interest in Antarctica by "conducting substantial research activity there". There are currently 29 Consultative Parties, and other 25 Non-Consultative Parties invited to attend the Consultative Meetings. The Non-Consultative Parties do not participate in the decision-making (*ATS, 2020*). Figure 4 shows the countries currently present in Antarctica.

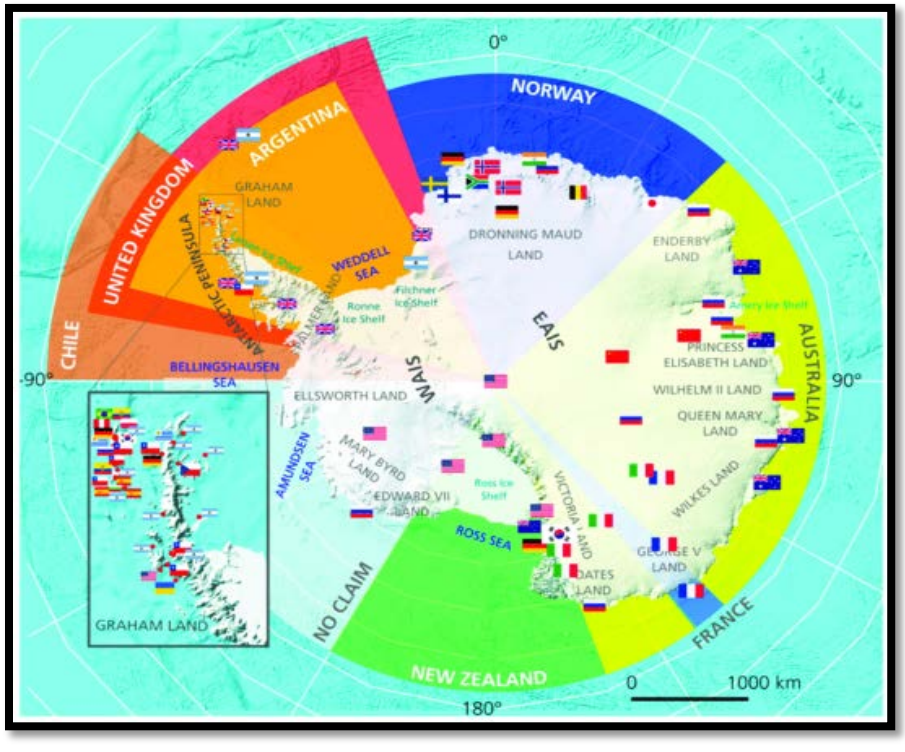


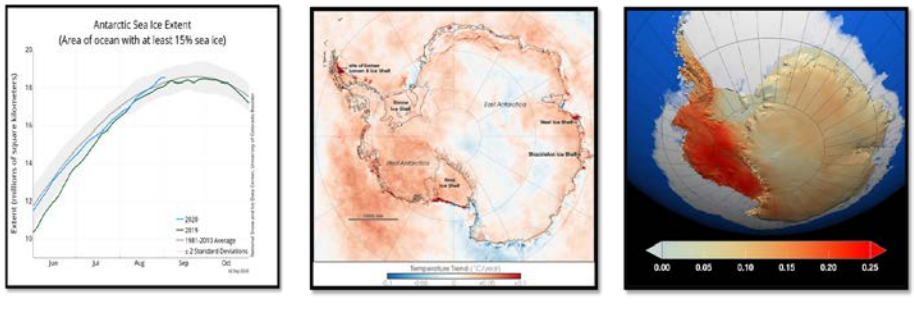
Figure 4: *Map of Antarctica visualizing territorial claims and locations of national research facilities (flags) (Research Gate Website)*

The Antarctic Treaty launches mechanisms for the protection of the Antarctic territory, and in its Article XIII, it is established that "it shall be open for accession by any State that is a Member to the United Nations"(*Lamus, 2013*). Though Bangladesh was not born in 1959, it is presently a member of the UN and the country has the legal rights to accede the Treaty.

Taking the prescription of the famous OODA loop such as to observe, orient, decide and act decisively, and as part of understanding the Antarctic, one needs to understand firstly; why the Antarctic ice sheets are currently changing. Secondly, it is necessary to find out whether the Antarctic ice sheets will continue to change in the future and thirdly, how fast and by how much the sea level will rise. Finally, we need to know how Bangladesh can mitigate melting of ice glaciers of the Antarctic from flooding the BoB.

The sea ice of the Antarctic matters for Bangladesh, and she needs to care about it because it is responsible for regulating global temperature. The scientists state that sea ice has a bright surface. Earth's sea ice is also very attuned and sensitive to even minor changes in global surface and ocean temperatures. Thus, about 50 to 70 per cent of incoming energy is reflected into space. It is also essential to understand that what happens in the Polar Regions, does not stay in those regions because these changes affect global temperatures, even impact ocean circulation influencing the global climate (*NASA, 2019*). Bangladesh, situated in the low lying deltaic plain, becomes one of the first victims of the melting glaciers, rising temperature and eventually the inundation from increasing sea level.

Antarctic and Southern Ocean Coalition (ASOC) believes that understanding climate change impacts on Antarctica is a matter of critical importance for the world and for the continent itself. New data from space (Figure 5) provides the most precise picture yet of Antarctica's ice, where it is accumulating most quickly and disappearing at the fastest rate, and how the changes could contribute to rising sea levels. (*NY TIMES, 2020*).



Extent of Antarctic Sea Ice up to 2020
Courtesy: National snow and ice data center, University of Colorado Boulder

Temperature trends in Antarctica 1981 – 2007
Courtesy: NOAA satellite sensors. Author: Robert Simmon, NASA Earth Observatory

Antarctic surface temperature trends for 1957-2006.
Courtesy: NASA

Figure 5: *Visual comparison of Antarctic surface temperature trends and ice extent 1957-2020.*

ASOC posits that the greatest threat to the world comes particularly from the West Antarctic Ice Sheet (WAIS). According to ASOC, if melted completely, the WAIS contains "sufficient ice to raise worldwide sea level by more than 60 meters". Accordingly, notwithstanding the uncertainty, a modest disproportion between 'input and output of ice' might contribute grossly to the present-day rise in sea level by 1.5–2 mm/year. (*ASOC, 2020*).

INTERPRETING A REALIST'S PARADIGM: NATIONAL INTEREST DEMANDS COMPREHENSIVE ENVIRONMENTAL PROTECTION

How to define, interpret and prioritise national interests remains a matter of substantial dispute. Scholars like Dr Miskel, an American Professor of National Security Affairs at the Naval War College, and Israeli military historian and theorist Martin van Creveld forcefully argued that there could be no agreement about what constitutes the national interest and the utility of national interest (*Liotta & Miskel, 2004 and Creveld, 1991, p. 217*). Dr Liotta, however, in a reconciliatory tone maintained that "national interests reflect the identity of a people - geography, culture, political sympathies, and social consensus, as well as economic prosperity and demographic makeup". Therefore, national interests may be understood as "little more than a broad set of often abstract guidelines", allowing a nation to act the way it is convinced. Dr Liotta also posits that national interests likewise answer the fundamental but essential question "what are we willing to die for?" (*Liotta, 2003*).

The classic realist thinker Hans J. Morgenthau mentions two levels of national interests - the vital and the secondary. Vital interests guarantee a nation of its security, freedom and independence, and enshrinement of its values. Vital interests represent issues about which a nation is willing to go for war. Secondary interests, on the other hand, are more difficult to define, except that they involve compromise and negotiation. Thus, "the national interest, admittedly, is a pretty slippery concept. Yet how one views, focuses on and consistently acts upon such interest will prove the true test of larger 'grand' strategic perspectives. The bottom line, after all, remains unchanged: what a nation wants, and its citizens are willing to go to war over - and to die for - remains unchanged as a fundamental interest." (*Liotta, 2003*).

There is geopolitical lining in the realpolitik cloud, though apparently foremost contemporary concern about Antarctica is the environmental protection. It was, however, not the initial Antarctic Treaty objective. There is no denying that its original nature was highly geopolitical. In fact, the environment itself, let alone the Antarctic one, was not an issue on the global agenda in the 1950s. The international concern about the environment was first expressed in the Stockholm Conference in 1972. Thus, the interest in the Antarctic environment is very contemporary to the global one (*Walker, 2011*).

The Antarctic triggered environmental impacts and its affects to Bangladesh are summarized in Table 1.

Table 1: *Views of Bangladesh on Climate Change and its possible Security Implications. (https://sustainabledevelopment.un.org/contents/dsd/resources/res_pdfs/ga-64/cc-inputs/Bangladesh_CCIS.pdf)*

Environmental Impacts Triggered by the Antarctic	Environmental Affects to Bangladesh
Rainfall and Changes in seasons and quality and quantity of water	Waterlogging, landslides, floods, crop damage, drought, salinity intrusion, coastal erosion, riverbank erosion, increasing death, illness etc.
Increased frequency and severity of droughts, floods and storms	Agriculture, forestry, livestock, water, energy, food security, health, infrastructure etc.
Sea level rise	Climate migrant and loss of livelihood Coastal management Disaster response and recovery plans
Glacial melt	Loss of territory and triggering of climate refugee

Realistically speaking, there could be a consensus that 'comprehensive environmental protection' is of national interest for Bangladesh. However, the question of whether 'comprehensive environmental protection' falls under vital or secondary category of national interest - can be debated. There cannot be logically a 'one size fits all' argument. Besides, there is no water/gas-tight compartmentalisation between the two-category of national interest. In addition, the Figure 6 can be helpful for this article to determine that comprehensive environmental protection for Bangladesh obviously falls under the 'vital' category of national interest, because it poses a grave threat to the country's very existence.

Reflecting as a realist upon the traditions of the Westphalian model, generally post Second World War and specifically post-cold war world order in vogue, I would like to recommend appropriate climate mitigation actions based on Bangladesh's vital national interest to address Antarctic climate change. This would remain a far cry until Bangladesh becomes a party to the Antarctic Treaty system. It would naturally be challenging as a first category climate victim to let Bangladesh's concern be heard and noticed by the powerful others. Imitating Irish statesman Éamon de Valera it may be correct to say, "it is indeed hard for the strong to be just to the weak". (*Williams, 2008*).

WILL IT BE A PREMIUM: ENTERING INTO THE ANTARCTIC TREATY SYSTEM

Honourable Prime Minister (HPM) of Bangladesh Sheikh Hasina has hailed Bangladesh and its people for their resilience in natural and human-made disasters. According to her, Bangladesh is a unique example of climate vulnerability vis-à-vis resilience. She pointed out specifically that "even a 1.5-degree Celsius rise of temperature will have severe consequences for Bangladesh and the region". In addition to Bangladesh's commitment to implement the Paris Agreement, Bangladesh has adopted other measures to limit carbon emissions and environmental degradations. To offset climate change impacts, the country also has undertaken various mitigation and adaptation programmes under the Bangladesh Climate Change Strategy and Action Plan formulated in 2009. On 24 September 2020, during the high-level climate roundtable at the UN, Bangladesh's HPM made two of the most vital points where she called on "polluting countries to take responsibility and spoke up for climate refugees". (*Shetty, 2020*).

The recent establishment of Global Centre on Adaptation (GCA) for South Asia regional office in Bangladesh is yet another enterprise expected to facilitate, support and develop adaptation and climate resilience. In addition, other initiatives per excellence include the establishment of Climate Change Trust Fund in 2009; allocation of 430 million US dollars from own resources to implement the action plan. Since 2010, spending about 1% of Bangladesh's GDP equivalent to US$2 billion per year for adaptation purposes was achieved. Furthermore, a long-term initiative to tackle the challenges of climate change and natural disasters - the Bangladesh Delta Plan-2100 has also been initiated. However, the harsh reality is also that before affected people recover from one disaster, another strikes, reversing whatever progress is made. Bangladesh thus, still needs to build greater resilience to do something more to mitigate the effects of climate-related disasters.

Bangladesh acknowledges that 'a lot of things' still need to be done to reduce the climate change impact. As the climate change is a global affair, a collective "Nationally Determined Contributions" is essential to share good practices on adaptive measures executing 2015 Paris Agreement to safeguard and build a better future for all of us (*BD News 24, 2020*).

Former UN secretary-general Ban Ki-moon has lauded Bangladesh for its efforts to mitigate the effects of climate change and natural disasters. However, he emphasised sharing the best adaptation practices among the nations when he says "we need to do it quickly, with combined expertise and financial resources" (*BD News 24, 2020*).

The main aspects of Antarctic and its evolution from a geopolitical assessment to the contemporary realist's approach of environmental protection include its environment that has essential value for biodiversity. To identify its geostrategic and geo-economics importance, one needs to understand and identify its huge

reserve of freshwater and potential source of natural resources. Today, scientists are very concerned about Antarctica. Arguably, statesmen and virtuous strategic military commanders should also be worried. The area is 14 million km², and about 98% of it is covered by ice. Appropriately, Antarctic is called by the Treaty parties "… a natural reserve, devoted to peace and science". (*BAS, 2020*).

Furthermore, the Antarctic region has extensive reserves of strategic mineral resources that have not yet been explored. About 170 types of minerals have already been mapped (gold, silver, iron, natural gas, etc.), capable of serving the world economy for 200 years. The exploration of these resources will be decided from 2048, when the consultative parties to the Antarctic Treaty System will meet to define, again, the future of the continent. (*Souza, 2020*).

Experts estimate that Antarctica may have a reserve of 200 billion barrels of oil, much larger than that of some countries in the Middle East, such as Kuwait and the United Arab Emirates. The Antarctic oil is extremely difficult to reach and, now, prohibitively expensive to extract. In 1991, the Madrid Protocol banned mineral exploration in the Antarctic continent for 50 years. However, the fear is that when the time comes to renew the agreement, the world may be desperate for energy and Antarctica will end up becoming the new "Eldorado" of oil. (*Kristoschek, 2020*).

To uphold the constitutional dictate of 'promotion of international peace, security and solidarity', (the Constitution of the People's Republic of Bangladesh, part II, art 25), Bangladesh remains a top troops contributor for UN peacekeeping operations in recent decades. (*Anik, 2020*). The spirit of the constitutional preamble, as well as the 'Fundamental Principles of State Policy' such as 'nationalism', thus equally prescribe to 'make our full contribution towards international peace and cooperation in keeping with the progressive aspirations of mankind'.

Hence, evoking Morgenthau, it may be said that it is of vital national interest for Bangladesh to firstly understand and then participate along with the other 'Antarctic Treaty Nations' in substantial scientific research; specifically, to acquire, and conserve more resources vis-à-vis securing comprehensive environmental protection of the Antarctic. Remaining an 'outsider' to the 'Antarctic Treaty Nations', Bangladesh will never be able to find correct answers to the questions as to why the Antarctic ice sheets are currently changing, whether the Antarctic ice sheets will continue to change in the future, how fast and by how much the sea level will rise; or most vitally how Bangladesh can mitigate melting of ice glaciers of the Antarctic from flooding the BoB.

SUGGESTED STRATEGIC ANTARCTIC RESEARCH PRIORITIES FOR BANGLADESH

The essay "A roadmap for Antarctic and Southern Ocean Science for the Next Two Decades and Beyond" suggests that the goal is to maximise scientific return

by minimising the human footprint in the Antarctic region. Besides, the essay highlighted international cooperation engaging diverse stakeholders. What is meant by the cooperation is the coordinated effort by wider international partnerships regarding scientific research, infrastructure development and extended knowledge-sharing (*Kennicutt. et al., 2014*).

Scientific Committee on Antarctic Research (SCAR) has thus endeavoured to begin an Antarctic and Southern Ocean Science Horizon Scan "to create a process that could be regularly used to recognise the highest priority scientific questions that the science should aspire to answer". In this first scan, the timeframe was the next two decades and beyond. (*Kennicutt. et al., 2014*). Therefore, in 2014, SCAR assembled 75 scientists and policymakers from 22 nations to agree on the priorities for Antarctic research for 2035 and beyond. In the meeting, they identified research questions that fall broadly into six themes such as

- Define the global reach of the Antarctic atmosphere and the Southern Ocean; Understand how, where and why ice sheets lose mass;
- Reveal Antarctica's history; Learn how Antarctic life evolved and survived;
- Observe space and the Universe;
- Recognise and mitigate human influences. (*Kennicutt et al., 2014*).

ASOC advocates various climate change-related activities to be heard and acted upon by the scientifically advanced wealthy nations from among the 'Antarctic Treaty Nations'. Its recommendations revolve around four key areas: reduction of greenhouse gas emissions, implementation of climate adaptation strategies and promotion of globally important climate science and designation of marine protected areas (*ASOC, 2020*).

The United States Antarctic Program (USAP) that includes scientific research and related logistics is managed by the National Science Foundation (NSF). NSF recommends pursuing the following three strategic research priorities for the near-term:

*How fast and how far will sea level rise? The Changing Antarctic Ice Sheets Initiative;

*How does Antarctic biota evolve and adapt to the changing environment? Decoding the genomic and transcriptomic bases of biological adaptation and response across Antarctic organisms and ecosystems; and

*How did our Universe begin and what are the underlying physical laws that govern its evolution and ultimate fate? And a next-generation cosmic microwave background program (*NSF, 2015*).

Brazilian Antarctic Program (PROANTAR) aims to promote diversified and high-quality scientific research in the Antarctic region, to understand the phenomena that have global repercussions, particularly on the Brazilian territory.

Brazil, thus, as Consultative Member of the Antarctic Treaty, ensures Brazilian participation in the decision-making processes concerning the future of the continent (*Kristoschek, 2020*).

The distance between Antarctica and Bangladesh is about 12059 km. But one needs to understand that the impacts of climate change are not confined around Antarctica. Scientists fear that water stored in ice on land and ice sheets may melt and contribute to sea-level rise. And there is every possibility that sea-level rise could be higher than the estimates. The Antarctic contains 90% of the world's ice. Floating ice shelves also increase sea level. If the expenditure required to protect only London against flooding due to sea-level rise exceed the cost of £20B (*BAS, 2020*), imagine the cost involved to protect Bangladesh from submerging into the BoB?

Thus, the suggested strategic Antarctic research priorities for Bangladesh may include:

- understanding how fast and how far the sea level will rise;
- articulation and implementation of climate adaptation strategies;
- how Bangladesh can mitigate melting of ice glaciers of Antarctica from flooding the BoB; and
- how to benefit from the Antarctic resources vis-à-vis securing comprehensive environmental protection.

CONCLUSION: ANALYSIS AND RECOMMENDATIONS

Why should Bangladesh, like some other countries in the world, want to hoist her flag in Antarctica or, by extension, want a piece of Antarctica? A realist approach of geopolitical, economic, environmental, and scientific factors briefly discussed above explain the interest of Bangladesh in the frozen continent aptly. Besides, for Bangladesh, it is an existential issue – a vital national interest as the number one climate victim, and an essential national need to acquire additional resources vis-à-vis comprehensive environmental protection for sustainable development that currently Bangladesh is traversing.

Having more than two-thirds of the world's freshwater reserves, the Antarctic plays an important role in maintaining the Earth's balance of 'temperature'. Besides, the waters surrounding Antarctica are an essential part of the so-called "Oceanic Conveyor Belt", a belt formed by ocean currents that travels across the planet. Without the help of the oceans around the region, Earth's waters would not circulate in a balanced and efficient manner. Despite the distance, in the case of Bangladesh, what happens in the Antarctic directly influences her climate;

global warming, sea-level rise and the threat to trigger climate refugees are important instances.

A wide variety of scientific research is underway in Antarctica. Therefore, maintaining a base on the frozen continent is important to conduct research in extreme conditions and to better understand the functioning of the planet. According to experts, the frozen continent is a kind of "record" of what the climate of our planet was like in the last one million years. The region also reveals a lot about the impact of human activity on nature. In 1985, for example, scientists at the BAS discovered a hole in the ozone layer over Antarctica. The hole results from damage to the atmosphere caused by human-made chemicals. Experts also see Antarctica as a new frontier for medicine discovery.

One-fifth of the 21st century has already been lost in the pit of time, during which various schools of geopolitical thoughts have intermingled, reappeared, or are proved and disproved. But countries that have made more significant strides in terms of development appeared to be 'forward-looking realists' to strategize 'realpolitik' in their favour. Thus, the Antarctic has already become a 'semi overt' geopolitical hotspot poised for 'realpolitik' contest in future.

Over the millennia, civilisation has progressed almost in all dimensions and invented or discovered enormous beneficial blessings. It may be argued that 'Antarctica' is one such blessing, a vast reservoir of extractable resources, and prime mover of climate, that attracted powerful nations in the last two centuries. The mission to hoist Bangladesh's flag in Antarctica; the disc that represents the sun rising over Bengal, the blood of her heroes, who died for the independence of Bangladesh, and the green field signifying lushness of the land as well as the eternal youth of Bangladeshis, can never be sufficiently emphasised even by a realist.

Recommendations

Currently, almost all developed countries have a space in Antarctica and some emergent countries too. They are not the owners of the land; however, these countries are conducting scientific research and getting ahead in what comes to the Antarctic knowledge. In that sense, and thinking about the outcomes of 2041, it is time to start putting Bangladesh's mark – the 'red and green flag' in the frozen continent. It does not necessarily take building a station in Antarctica immediately, but involves engaging reputed academia in starting scientific research and cooperating with countries already established there.

Bangladesh may participate in the Antarctic issues in three different levels in three different time frames. In the near-term, at the political level, this can be achieved by entering into the treaty system. In the short-term, at the operational level, it can be achieved by conducting scientific research and in the mid-term to long-term, at the tactical level, arranging effective presence on Antarctica will help us to reach our goal. However, the declaration to hoist the flag in Antarctica may thus be made during the Centenary Celebration of the 'Mujib Barsha'.

To do this, within the Antarctic Treaty framework, Bangladesh government may establish an organisation, 'Bangladesh Antarctic Policy Council', at the political level (organisation and detail layout of the broader guidelines may be worked out separately), which would normally direct the Antarctic Office at the Ministry of Foreign Affairs (Maritime Affairs Unit)/Ministry of Defence/Armed Forces Division.

Scientific research may be coordinated by the Bangladesh Antarctic Institute, which may be established in Bangabandhu Sheikh Mujibur Rahman Maritime University/Dhaka University (International Centre for Ocean Governance)/Chittagong University (Department of Oceanography)/National Defence College. The Institute will have to play a key role in national Antarctic research and is to be honed by a number of public and private universities that will have Antarctic research programmes. Besides, the support of the people of Bangladesh is fundamental to drive the policymakers' attention to the subject. Thus, it is recommended to engage both the Bangladesh Institute of International and Strategic Studies (BIISS) and the Bangladesh Institute of Maritime Research and Development (BIMRAD) in the efforts to get the attention of the population about the Antarctic by arranging seminars and symposiums about Bangladesh's stake in Antarctica to create awareness among the intelligentsia and the academia.

To arrange effective presence, at the tactical level, in the mid/long-term, Bangladesh Armed Forces need to be integrated into the program. Bangladesh Army needs to have a permanent base in Antarctica with specially equipped and trained staff for rescue, evacuation and environmental emergencies. Bangladesh Navy (BN) will have to play the pioneering role as 'Chief Coordinator' with all other relevant ministries and institutes. Thus, BN needs to establish a separate directorate, namely Directorate of Antarctica (DANT), apart from training and selecting its Port Authority Units to make them in charge of naval security in various parts of the Antarctic Peninsula, control of environmental damage including control of illegal exploration and unregulated fishing. Bangladesh Air Force may act along with other international aviation authorities in the area of the Antarctic Peninsula as dictated by the National Antarctic Policy.

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INTEGRATING MACHINE LEARNING IN MILITARY INTELLIGENCE PROCESS: STUDY OF FUTURISTIC APPROACHES TOWARDS HUMAN-MACHINE COLLABORATION

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Abstract: Automation of Military Intelligence (MI) through Artificial Intelligence (AI) has broaden the spectrum of information collection procedure and analysis function in many folds. In today's digitized world, data is produced in exponential way by every minute. Intelligence agencies around the world are experiencing new dimensions of the information what used to be overlooked due to limitation of human capacity to handle such large data set. Emergence of AI with Machine Learning (ML) as one of its subsets has brought a revolutionary approach to collect the surge of information and analyzing with numerous ML algorithm to produce various intelligence summary for strategic, operational and tactical leaders both in peace and war time. To deal with the traditional and non-traditional threat, ML based MI data collection and analysis are carried out through supervised, unsupervised, reinforcement and deep learning approaches where degree of automation is decided through human-in-the loop and human-out-of-the loop method. These ML tools will help developing system framework which will be able to sense and respond to the operational environment through adaptive learning technique so as to learn from its experience, adapt with the changing environment based on previous learning and experience. Incorporation of smart security sensors, surveillance unmanned aerial vehicle, earth observation satellites, electronic and virtual source monitoring system can augment the information collection system of MI organizations. Data analysis and data fusion can be carried out by regression, classification, time series analysis, cluster analysis, topic modeling, collaborative filtering and association rules within the framework of 4-Tiers of framework as Collection Sources, Storage & Processing, Fusion & Profiling and Data Sharing augmented by military cloud network and Internet of Things (IoT). Collaborative approach with the other Armed Forces Services, concerned Ministries, Engineering Universities and commercial Stake Holders will help formulating future policy guidelines, research & development,

ML algorithm development program and production of compatible hardwires for various ML based MI platform and applications.

Keywords: *Military Intelligence (MI); Artificial Intelligence (AI); Machine Learning (ML)*

INTRODUCTION

Military Intelligence (MI) is the process of collection, interpretation and dissemination of information to Military Commanders to assist in their decision making process. It studies the broad operational environment, analyze various actors, synchronizing relevant information and monitors ongoing events both in peace and wartime. With the advancement of technology, the spectrum of data band from various sources have been increasing in many fold and in multi-dimensions. The data is generating from strategic, operational and tactical tiers encompassing people from political, military, economic, social, business, media and many more background occupation. The intelligence analysts often face the complex task of making appropriate conclusions from this mass of information. The hypothesis drawn out of available data cannot be claimed as conclusive as it cannot be validated through maximum collected information sources. As the generated information is dynamic in nature over time and space with the evolving nature of changes of situation at a rapid pace; a conclusion drawn out of a set of information may often need validation which sometimes even ruled out in the given context due to limitation of handling such massive volume of data and information. Moreover, the authenticity of the sources need to be checked out regularly through various correlation analysis with other sources which has clear impact on the hypothesis drawn out of such information.

Undeniably, there are vast area for improvement in case of collection, analysis and correlation assessment of information due to extreme data generation spree from various sources. Use of Artificial Intelligence (AI) and Machine Learning (ML) in the collection and analysis process can be the futuristic approach. Many technologically advanced counties are transforming their intelligence system by ML using AI. Therefore, it needs to be assessed and evaluated whether ML can be adopted in the collection of intelligence information and subsequent analysis so that it can harmonize the massive flow of data both in peace and wartime to get the most accurate conclusive picture of battlefield environment and contemporary global situation.

MI is a dynamic process as due to ubiquitous activities of various actors of interest who generate a continuous flow of data. The 360^0 assessment and analysis of data, dissemination of data to concerned stakeholders, conduct of appropriate action and monitoring corresponding impact are the inseparable procedures which can

be conducted through automation driven by ML system. Moreover, functioning of Command, Control, Communication, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) system can be boosted and operated more efficiently through ML system where the integrated system can learn from the environment and propose assessment based on iterative learning process from human operator. Therefore, integration of military intelligence, reconnaissance and surveillance can be brought under an integrated command functional system where use of AI through ML can broaden the horizon of military outlook.

CONCEPTUALIZING THE MACHINE LEARNING MODELS FOR MILITARY INTELLIGENCE PROCESS

Shu-Hsien, et al., (*2003*) highlighted a knowledge based architecture for future military intelligence planning system. A number of system architecture and system configuration have been discussed with application of ML in the form of subset of AI where a transition of automated and semi-automated analysis methods are presented. Moreover, a typical model with hypothetical system implementation strategy has been discussed.

Prelipcien, et al., (*2010*) have highlighted various AI algorithms which can be used for analysis and decision behavior model. A brief description is carried out for neural network application, generic algorithms, fuzzy logic and expert system. A set of suggested model describes that neural network can be used for pattern recognition but lacks in decision making application. Generic algorithm can be widely used for developing variety of decision options which has self-learning principle of dynamic adaptability with the environment. Fuzzy logic has been recommended for decision rules based on relationship between input and desired output. It assists in manoeuver planning and force allocation but lacks specific judgment decision. Expert system is based on knowledge based rules identifying and determining timing of action in particular situation. The discussions have been focused on application of ML as designed by various algorithm model.

Dijk, (*2019*) in his conference preceding on AI and ML in Defense Applications compiled a number of ML model for MI analysis methods. The methods pertinent to fulfill the research objectives are unmanned sensors and systems, acoustic detection of UAVs using ML methods, situation awareness through unmanned aerial system, video surveillance in the visible and thermal spectral range, neural network for visual recognition, deep learning for behavior recognition in surveillance application, deep neural network model for hazard classification, information extraction and semantic world modelling and object based multi spectral image fusion method using deep learning are proposed for military intelligence analysis.

Ahmed, (*2019*) highlighted relative importance of AI application in surveillance field for Bangladesh (BD) Armed Forces. Among various development plan of

AI subsets, it was found that ML and Deep learning (DL) would be the initial subset through which BD Armed Forces can propel through AI atomization. An AI implementation road map architecture has been elaborated which can be used as initial startup reference for exploring the desired objectives of the study. The survey responses has been used for understanding the opinion and guidelines to implement ML under various AI subsets for MI analysis framework.

Mitchell, et al., (*2019*) have discussed interlink between elements of the intelligence cycle and enumerated how ML can be applied as the subset of AI in various stages of intelligence cycle. The potential work time available to all intelligence agents due to adoption of automation through AI has provided a deep insight about the extent of acceleration of agent's efficiency in quantitative value. This has provided a quantitative comparison on efficiency of an intelligent agent while applying ML in intelligence process.

The State Council of China (*2017*) highlighted the potential general technologies, support platforms and future AI industries in order to develop intelligent computation technology to be used in future AI driven major science and technology projects. It is important to find that the knowledge computing technology is built on adaptive ML with analytical reasoning technology. Among these, key swarm intelligence technology, cross medium analytical reasoning technology knowledge computing & service technology, architecture for hybrid and enhanced intelligence, intelligent autonomous unmanned systems, intelligent virtual reality technology, intelligent computing chips & systems and natural language processing technology have been the key focus of innovation for exploring the future military intelligence analysis. Along with these, the development plan of academic research on big data intelligence theory, cross-media sensing theory, hybrid and enhanced intelligence theory, swarm intelligence theory, autonomous coordination and control, optimized decision-making theory, high level ML theory, brain inspired intelligence computing theory, swarm intelligence theory and quantum intelligent computing theory have been projected as guiding academic discourse on ML application for intelligence analysis. These will build knowledge-based architecture for future military intelligence analysis through ML. These are essential academic guidelines where continuous development would create Research & Development program for ML for military intelligence analysis. Together with this theoretical framework, Haridas (*2015*) has put forward Big Data analytics which is utilized for intelligence gathering for national and military intelligence where big data analytics based intelligence can provide requisite output for decision making. ML is used as a tool in big data analytics in a neuro-network of intelligence data collection framework by which threat alert system, social media monitoring, information mining, document analytics and cyber security can be carried out. A conceptual layout of big data application based intelligence gathering system is discussed where real time advanced analytics on various information data from multiple collection sources can be carried out to provide situational awareness, decision making and

battle assessment. These have given a detail theoretical concepts on which research & development of ML can be carried out in future.

Michael O'Hanlon *(2019)* forecasted an eminent change in military technology in next 20 years where he focused on future trend of military technology. Among four categories of breakthrough of technology, the first is sensors which gather data of relevance of military operations and the second is computer & communication system that process and distribute that data. A projected advances in key deployable technologies 2020-2040 is predicted where probability of deployment of sensors and other communication system are shown. It provides a clear projection about future development of intelligence collection sources, communication and information processing technology. Connable *(2012)* highlighted the fusion process of various forms and format of intelligence data and presented how the fusion process is essential for future complex environmental analysis of relevant national and international actors. A System-of-Systems analytic map encompassing political, economic, military, social, and informational infrastructure explains how the 360º information flow is affecting both strategic and operational center of gravity which validates the disruptive transformation of future intelligence data collection and processing spree. It depicts how fused intelligence picture reflects better ground picture thus helps intelligence agents to understand the complex socio-politico-military environment and produce interlink with the big picture. Thus a paradigm shift is sought in regards of intelligence data fusion analysis for future complex operational and strategic scenario.

To conduct the fusion of data from various sources, Cruickshank *(2019)* proposed to develop the ability of MI structures to distill knowledge from raw data through application of Data science. It is proposed that using ML and other AI techniques, Data science would be the preferred discipline for analyzing both structured and unstructured data from various collection sources. In this regard, Kendrick *(2019)* showed a framework of adopting Data-Centric Culture at all Army echelons. This allows an institutional approach to integrate data science effectively into Army intelligence at every tier of Army decision and execution level. The Data science tools can automate the complex steps of intelligence process which ultimately develop the MI database. These concepts can provide to develop suitable ML models for military intelligence process.

Dopico, *et al.*, *(2009)* in their "Encyclopedia of Artificial Intelligence" compiled a large number of research articles on present development of AI technology. Among the articles, various latest intelligent system modelling, adaptive technology, artificial neural network, AI for information retrieval, cognitive modelling, behavior based clustering of neural networks, decision making in intelligent agents, facial expression recognition program, hierarchical reinforcement learning, natural language processing program, supervised learning by fuzzy logic system and swarm intelligence approach model can provide a start-up framework that can be used to explain how ML can be used in interpretation

of intelligence data and transform those to usable information. There are ML program development guidelines which can be of immense importance for research & development program for ML system for MI analysis.

GLOBAL MILITARY MACHINE LEARNING APPLICATION FOR MILITARY INTELLIGENCE ANALYSIS AND VARIOUS MACHINE LEARNING MODELS

ML, a subset of AI has been used extensively by militaries of developed and developing nations in their various military application and war fighting platforms. ML is a subset of AI where algorithm language is used to analyze and learn from data (*Bhatnagar, 2018*). ML seeks to learn and adapt its pattern of thinking by analyzing meaningful relationship and pattern of data from examples and information which is designed to work in a similar nature of human cognitive logic (*Janiesch & Heinrich, 2021*). Use of AI as the key technologies to fight and win the war in future has been taken as future strategy by United States (US) declared by US National Defense Strategy in 2018 (*Defense, 2018*). Russia reiterated in 2017 to pursue AI technology as the President of Russia publicly announced its stance for its future military outlook (Simonite, 2017). China has released a strategy in 2017 detailing a roadmap to lead military technology through AI by 2030 (*Council, 2017*). Project Maven is one of the leading ongoing military AI implementation project where Pentagon started military use of ML by converting drone video into actionable intelligence through Algorithmic Warfare Cross Functional Team in its campaign against ISIS in Iraq and Syria (*WEISGERBER, 2017*).

System Architecture for MI Process

MI process integrates intelligence, surveillance and reconnaissance (ISR) which develops the intelligence circulation (IC) process. Generally, it incorporates spatial database, attribute database, case base, rule base and a knowledge repository through which MI process works. Military reconnaissance is the process of acquiring information about hostile forces and terrain of own operational interest. Military surveillance is the monitoring of activity based on reconnaissance data in order to remain updated current situation of interest. MI incorporates the process of analyzing the reconnaissance and surveillance data and transforming the raw information to usable intelligence of military interest for current and future operations (*Liao, et al., 2003*). The framework of military ISR is shown in Figure 1.

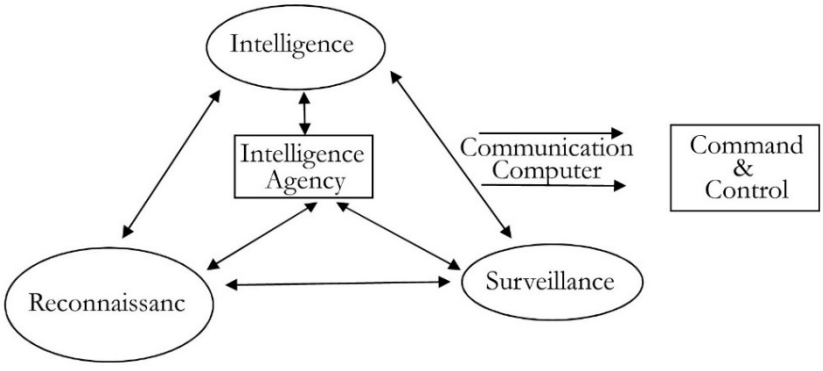

***Figure 1**: Framework of Military ISR (Liao, et al., 2003)*

The intertwined process of MI as evident from figure 1 enumerates that each process complements others and lack of activity in any of the process will bring down the entire IC process. The continuous coordination, revision, update and execution can be accelerated through automation with least error probability. Therefore, latest inclusion of reinforcement learning method of AI facilities the entire process through human-machine collaboration in the intelligence analysis framework.

The MI process has been carried out by using management information system (MIS) through which explicit knowledge is processed. But in today's world, there are huge volume of big data generating encompassing physical and virtual data. There are various kinds of databases such as attribute database, spatial database, case base and knowledge repository. Geographic information system (GIS) and knowledge based decision support system (KBDSS) are being used to integrate the function of decision support and knowledge management to enhance both explicit and tacit knowledge base. In this aspect, it was proposed to incorporate intelligent operation support system (IOSS) structure through which rich knowledge representation is done by hybrid reasoning strategy which proved its applicability in production decision system *(Xia & Rao, 1999)*. The system is operated based on learning from documented knowledge, learning from problem solving, and situational learning from problem solving failure and learning from forgetting. This is called adaptive and reinforcement learning that is the main attribute of ML and core function of AI. Due to dynamic nature of intelligence collection, accumulation, analysis and dissemination functions, reinforcement learning based ML functions is becoming more popular and depending approach towards MI process.

Hierarchy and Configuration of MI Process

Hierarchy and configuration of MI is broadly divided into three levels *(Liao, et al., 2003)*. The first level consists of operational and tactical intelligence collection

organizations and units. These are employed to collect data, pictures, signal and cyber information through reconnaissance and surveillance operation. These operations are broadly sub-divided into human intelligence, signal intelligence, image intelligence and communication intelligence. The second level conducts different intelligence analysis of the data and information provided by the collection organization and units. At this level, both routine and special intelligence report is provided based on day-to-day and emergency requirement respectively. The archiving of routine intelligence is one of the essential part at this level which is updated regularly and retrieved in terms of necessity. The third level is the user organization, higher headquarters and senior leadership who often place the requirement of intelligence. They are also provided with regular update of situation awareness and special circumstances of operational and tactical value.

The operational process of MI is divided into regular and special mission. In regular mission, operational attention is focused on basic intelligence collection based on routine and standard operating procedures. The special mission which is often time bound, focuses on acquiring specific intelligence from particular event, situation and persons. Both of these operational process thus develop IC which is shown in Figure 2.

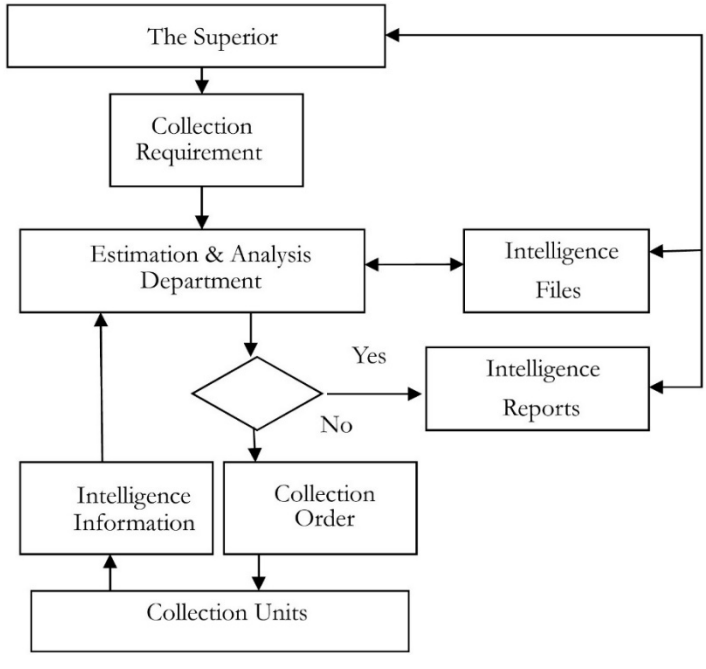

***Figure 2**: Military Intelligence Operation Process (Liao, et al., 2003)*

The generalized intelligence operational process is built on the processing of raw data collected in the first level of MI collection organizations and units. The

process of converting raw data into information is done by tacit and explicit knowledge base. There are core differences between these two types of knowledge base. Tacit knowledge is the accumulation of experiences, logical thinking and guts feeling of any intelligence agents which is more of personal attributes in nature (*Oliver, et al., 1997*). It varies within persons and the decision out of such knowledge base is often unexpected and may not be based on logical reasoning (*Hedlund, 1994*). Though there are instances where tacit knowledge proved to be the reasonably the correct way to predict any outcome based on intelligence findings. On the other hand, a set of rules, methods and techniques based on doctrinal fundamentals are explicit knowledge which is more precise, articulated and structured in nature (*Zhang & Griffith, 1997*). In addition, procedural knowledge is the standard operating procedure supported by explicit knowledge (*Anderson, 1985*).

Why ML is the Disrupting Technology for MI Analysis

In today's digitized world, the humans are floating in the abundance of data which are increasing in an exponential way. The variety, volume, velocity, vector and ubiquity of data are not only disrupting today's operational outlook but also endangering national security by overlooking the interpretation of the information carried through it. Under the adage of "Information is Power", the Security Forces must possess the capacity to interpret such constantly increasing structured and unstructured data and find pattern to help facilitating developing intelligence database for both peace and war time. The Intelligence Agencies around the world are reorienting and restructuring their traditional method of intelligence operation to accommodate the dynamic flow of data and preparing to analyze large data sets. It is evident that sustaining in the future technological era, intelligence outlook has to be broaden and dependent on amassing and organizing most of the data of own operational interest to visualize the future scenario.

Generally intelligence operation consists of five interconnected and interdependent cycle. These are Planning, Collection, Processing, Analysis and Dissemination (PCPAD). The Collection, Processing and Analysis (CPA) stages are crucial and need attention from technological aspect as the sheer volume of handing and processing have already exceeded the human capacity. The types of collection sources ranges from sensors, aerial system, satellites, radio signals, open source internet, social network, different organizations, agents, adversaries and many more. These data comes in different format in varying time and space in different medium either in the digital format as binary data or written & oral data. Thus, it needs a universal interpretation system where all types of format of data can be handled, stored, interpreted and common intelligence pictures can be made.

Having submerged in the flow of data according to Desjardins (*Desjardins, 2019*), the tech -savvy world is producing surges of data which is shown in Figure 3.

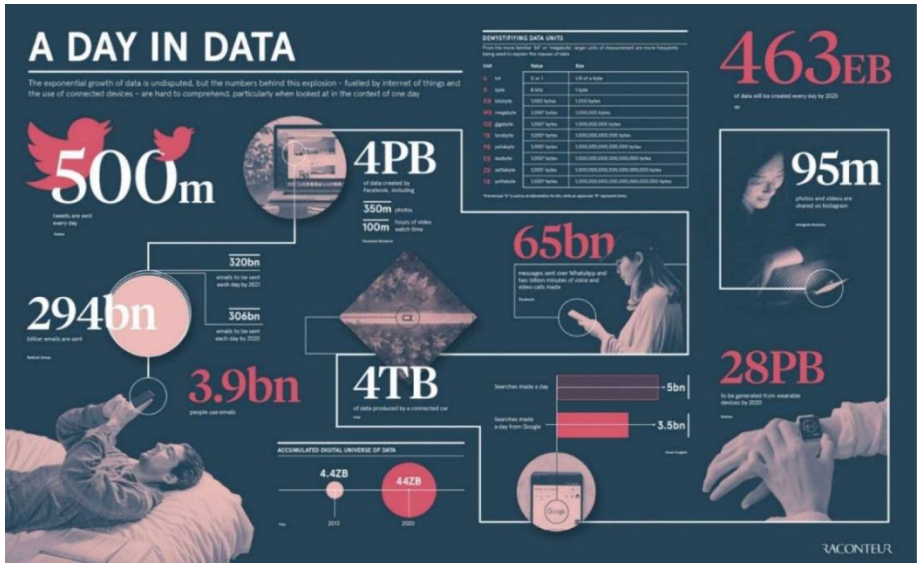

***Figure 3**: A Day in Data in 2019 (Desjardins, 2019)*

Bulao (*Bulao, 2020*) has summarized the following details about how much data is being generated in the world through information highways in internet world.

***Table 1**: Data Generation through Information Highway (Bulao, 2020)*

Volume of Data	By	By Time	Year
1.7 MB bytes	Each person	Each second	2020
2.5 Quintitrillion bytes	"	Every day	2020
463 Exabytes	"	"	2025
95 Million photo in	Instagram	"	2020
306.4 Billion	Email users	"	2020
5 Million Tweets	Tweets users	"	2020
3.5 Billion search	Google search engine	"	2020
350 Million photos in Facebook	Facebook users	"	2020
4 Petabytes	Facebook users	"	2020
500 hours of video	You Tube	"	2020
32 Billion IoT devices	Each person	Each second	2020

These are the glimpses of data volume and data type which will need to be analyzed for preparing intelligence database in peace time so that it assists in extracting essential element of information in need of time. Moreover, Non-

Traditional Security (NTS) threat remained high throughout the last decade and it has already appeared as new security concern. Therefore, intelligence against NTS threat need to be developed, updated and monitored each day to remain abreast of any impending situation due to the unpredictable behavior of actors. In war time, under active battlefield scenario, continuous reconnaissance and surveillance are essential and integral part of any operational activities. In battlefield environment, these data from various sources are added to the previous digital database, hence producing massive flow of data which is impossible to handle and organize by human operator using traditional collection, storage and analysis methods. In the ongoing technological era of AI, supervised and unsupervised ML is used extensively to collect massive volumes of data. The advantages of using ML is that it can train itself autonomously or semi-autonomously to arrange data that is needed for MI purposes which enables it to label the data with usable pattern. Therefore, ML system can easily sifts through billions of bytes of data and captures the needed types of data to create meaningful information for MI. While ML is applied in collection of data, the system prepares the data by correct identification, locating, profiling, sourcing, integrating, cleansing and storing through data mining (*Chan, 2020*).

Global Military Application of ML in MI

Having discussed the broad structure of MI process and system architecture, militaries of different countries have been developing and reorienting their MI process through supervised learning and reinforcement learning AI subsets by focusing on tacit and explicit knowledge respectively. Following this, an exhaustive restructuring has been carried out over various ongoing MI process systems which will have their dominance over next foreseeable future in the formulation of MI process. A few recent development of automated system for collection and analysis of MI process has been discussed briefly.

- Multi-Domain Command and Control System (MDC2) is one of the centralized platform to collect and analyze raw data collected from land, air, sea and cyber spaces through sensors and sources. These fusing of data to the central system is done to create a single information base thus creating a common operating picture for the decision makers *(CLARK, 2017)*.
- Border Surveillance System (BSS) has been developed to carry out automated surveillance on the objects and personnel along the borders. It consists of sensors, network sources and databases where the algorithm is developed to calculate the indicators which gives predictive values for the threat. It can not only estimate the level of threat but also can assess the level of uncertainty of a series of events. Bayesian Reasoning, Endorsement Theory, Fuzzy Reasoning, and Dempster Shafer Theory are used for the design of the BSS along with the programming algorithm (*Albertus C. van den Broek, 2019*)

- Acoustic Detector which operates through ML methods is an active detection system which can track and detect small miniature objects in the air and ground. ML approach is used to detect and evaluate multiple algorithms' performance using real time data as fed from various sensors and radars. This can differentiate various audio signature from audible and non-audible spectrum. The ML based detection algorithms can sift through noise deduction and produce actionable intelligence through operating environment (*Alexander Borghgraef, 2019*)
- Video surveillance in the visible and thermal spectral range through augmentation techniques employs deep neural network to record and detect texture and thermal images. The convolutional neural networks is designed under adaptive learning algorithm by taking sensor data from various sources and make decisions. It is particularly useful in large-scale multispectral Thermal World dataset in the long-wave infrared and visible spectral range (*Vanessa Buhrmester, 2019*).
- Deep learning for behavior recognition in surveillance applications has been using ML to automate the sensor data analysis in surveillance systems. The system works on the recognition of the behavior anomalies between persons and tracking persons with specific behavioral pattern (*Maria Andersson, 2019*). The system works on analyzing different behavioral characteristics with the preset behavioral patterns of people with people, people with object and people in particular places of interest. This is designed on supervised learning model where different behavioral category and patterns are installed with which subject behavioral characteristics are analyzed and examined to sift and detect required people of interest.
- Information extraction through Semantic World Modelling is developed for finished intelligence by combining and analyzing different intelligence input. These intelligence input are in the form of Human intelligence (HUMINT), Imagery intelligence (IMINT), Open source intelligence (OMINT), Virtual source intelligence (VIRINT) etc. The integration, processing, fusion and consolidation of information produce a common intelligence using data driven ML mechanism and a semantic world modelling is produced. These are developed for structured and non-structured data with deep learning methods *(Almuth Hoffmann, 2019*).

ML Algorithm Development Models for MI Analysis

There are efforts and development taken in the field of application of ML in the sector of defense, economy, healthcare, transportation, aviation, space technology, business and many more. It is interesting to find that the combined efforts can accelerate the development of defense application. For MI, many of these ML algorithm can be useful in exploring the application in future which have been under either theoretical study or already in industrial application.

Following some of the relevant ML, algorithm models have been discussed with their future scopes of applicability in MI analysis.

- Retrieval of multimedia information from internet sources and communication medium generate large volume of data in a high dimensional space. Active Learning Support Vector Machine (ALVSM) has been developing to deal with such high dimensional system and thus can act as an essential system for MI data collection and analysis *(Jiang & Horace, 2009)*.
- Agent Based Intelligent System Modelling is developed to sense and respond to the operation environment as an adaptive system to acquire and store information, learn from its experience, adapt with the changing environment based on previous learning and experiences and pre-determined objectives with revised direction with automaton or semi-automation control. The rules are continuously revised through adaptive learning which make the system appropriately encounter in the changing and evolving circumstances and make necessary decision output. The intelligent agent works on the principle of monitoring, listening and responding through agent-based modelling (ABM) with incorporation of human and machine-based data *(Tang, et al., 2009)*.
- Ambient Intelligence (AmI) seamlessly integrates smart devices and infrastructures through Internet of Thing (IoT). It integrates all the collection and surveillance sensors, intelligence system, human, computer and social interaction by speech recognition and image conversion. The system works through intuitive interfaces by cognitive reasoning and delivers suitable options to the agents *(Sadri & Stathis, 2009)*.
- Facial Expression Recognition System (FERS) works in cognition of human emotions and captures facial expression in a number of image sequences. Human-Machine interaction interprets the facial movement and analyze the emotional state *(Dornaika & Raducanu, 2009)*.
- Data mining and data warehousing are widely used to manage and analyze large datasets through pattern recognition technologies. Data warehousing can be used to store data which can be retrieved in time of need. Data mining is used to compress the huge repositories of information. It is a multi-disciplinary field covering large data sets, pattern recognition, ML, information & control theory, information retrieval, parallel & distributed computing and data visualization *(Zhou, 2003)*. The most pertinent data mining activities for MI analysis could be associations, sequences, classification, clusters and forecasting through neural networks, decision trees, regression analysis and memory based reasoning *(Wang, et al., 2009)*.
- Geographical Information System (GIS) with sensors, AI and ML produce digital mapping where inputs are taken from ground based

sensors, aerial platforms and satellites. It produces customized portable maps with updated objects placed in real time and space along with accurate geographical coordinates for detecting and tracking system. The image and object processing is done by deep mining modeling through adaptive and supervised ML (*Matheson, 2020*).

- Sensors based Cognitive Platform works through various data and image collection sensors in a wide neural network system. The platform is operated through Fuzzy logic and Genetic algorithms and form both Expert and learning system (*Hamblem, 2017*).

POTENTIALS OF MACHINE LEARNING FOR MILITARY INTELLIGENCE

To develop complete intelligence summary under the big picture, the need to correlate and fuse all intelligence data from multiple collection sources is obvious. There can be three categories of tools based on ML approaches such as supervised learning, unsupervised learning, reinforcement learning and deep learning. Alkire (*Alkire, et al., 2016*) categorized the analysis tool as Enable analysis, Perform analysis and Support analysis. Enable analysis tool under supervised learning approach helps intelligence agents to perform specific analytic tasks quickly, accurately and completely. This semi-automated tool performs the analysis task with human- machine interaction with human-in-the-loop structure. Perform analysis is a fully automated tool replacing intelligent agents; thereby operates under unsupervised learning approach with human-out-of-the-loop structure. The perform analysis tool can operate through task based and cycle based. Task based tool offload specified task from intelligence agents and complete the task autonomously. Cycle based tool perform all the steps of intelligence cycle completely without human intervention. Support analysis tool under reinforcement learning and deep learning operates through adaptive learning where it supports the intelligence agents by knowledge management databases, modeling, simulation environment, inter-personal collaboration, vertical and horizontal collaboration.

The synthesis of data is an essential step of intelligence data analysis. Its purpose is to combine all the disparate elements together as derived from various collection sources for developing intelligence summary of a single event and situation. This synthesis is carried generally in three levels. The primary level is basic analysis and exploitation where data from single source is summarized to make an intelligence product. This is the critical foundation level as the chain of synthesis to next level depends on this data combining stage. The advanced analysis and exploitation level interprets data from multiple sources where the analysis and exploitation become more complicated due to volume and types of data from multiple sources. Parallel to this level multisource analysis and multi-intelligence fusion can be created to find relationship between intelligence

products which can be considered a deeper stage. This is done mainly to find out data pattern so that forecasting of probability of any intelligence event can be predicted beforehand. The last level is all the source analysis where all available data are fused and synthesized together and a more accurate prediction of a target is done in regard to time, place and behavior. This type of analysis need a holistic approach towards combining all types of data format which can best be done by supervised learning ML approach.

Human-machine interface and human-machine collaboration are important phases of incorporation of ML in MI. Human-in-the-loop system has been preferred in the degree of autonomy of MI process. Incorporation of ML in MI process can be developed through a number of tiers. These tiers are interlinked and interconnected that can be placed from the headquarters to field units to facilitate flow of information from various sources.

Tier 1 (Collection Sources)

Tier 1 will primarily consist of human, mechanical and electronic sources. Sensors, drones, satellites and radars can be placed to collect image sources round the clock from all over the country and in the area of interest for operational purpose. Sensors are static devices, low cost device that can be readily placed in places of interest. There can be local area connection established between the sensors where the image data can be collected in local database maintained in the decentralized servers across the country. This data storage function will be coordinated in Tier 2 (Storage & Processing) where the storage of all the image data from the sensors can be collected, sorted and sifted in a central database. Drones and satellites are tactical and strategic assets respectively that can detect, track and locate stationary and moving objects. Drones can send the image data to both local and central database whereas satellite's data can be sent to central database. As satellites range extends beyond border of country, it may have a separate database for external image storage. Radars are static detection system which can detect flying objects, moving objects and terrain configurations. These image data can be stored directly to central database by optical fiber network.

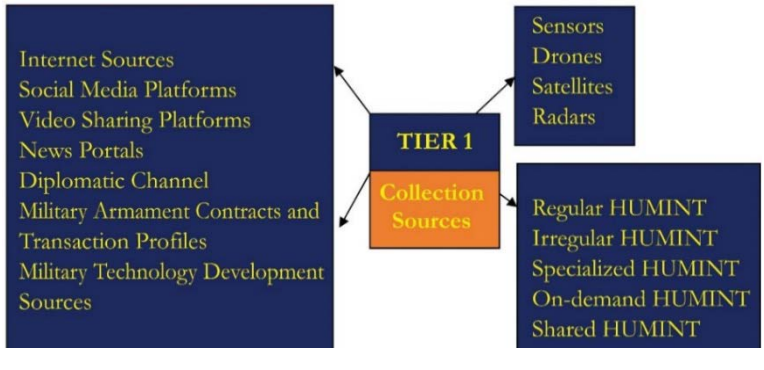

Figure 4: Tier 1 (Collection Sources)

Functions of Smart Security Sensors, Unmanned Arial Vehicle (UAV), Earth Observation Satellites (EOS) and Electronic and Virtual Source

Peace time surveillance is one of the major functions of MI department. For such purpose, besides manual and human collection of information, sensors, UAVs and EOS can play a dramatic role in collecting large volumes of data and information.

- **Smart Security Sensors**

Smart security sensors can build the critical element of MI collection system. These are static and inter connected sensors through Internet of Things (IoT) which can form a large surveillance network system across the border of the country. These can perform a wide variety of functions ranging from environmental monitoring, weapon control, communication & signal interception, monitoring military movements, crime detection, intrusion detection, NBC detection etc. There are various types of sensors which can be utilized for MI purpose based on their system of work and application techniques. Active sensors functions through own sources of radiation which operates in microwave and radio wavelength regions in electromagnetic spectrum. It supports various ML algorithm covering movement detection and intrusion detection. These are associated with radio signal processing from intricate noise spectrum through automated extraction process under ML algorithm. Smart and intelligent sensors functions through reinforcement learning mechanism which are multifunctional, self – diagnosed and self – compensated device. These are built with high resolution image sensing processors with higher processing chips which can rapidly transfer and share data from remote stations to central or local hub of database. Short wave image radiation mechanism has proven it as one of the sophisticated and reliable sensors for MI purpose. Micro Electro Mechanical System (MEMS) sensors functions through electro-mechanical sensors which are miniaturized in size and are very popular for its rapid deployment at short notice. These are ideal sensors in rough terrain and environment with prolonged duration of operation. The visual interpretation data generation process makes it one of the trusted detection sensors for military. Nano sensors work with Nano-technology and regarded as the state-of-the-art technology for MI purposes. These are durable, strong, light weight and works through adaptive learning algorithm. These emerging technology shares data through creating local virtual cloud network. These provide better connectivity in an inaccessible terrain configurations which works through cognitive learning methods with projection through augmented reality (AR) interface (*Electronicsforu, 2018*).

- **Surveillance Unmanned Aerial Vehicle (UAV)**

Surveillance Unmanned Aerial Vehicle (UAV) serves as one of the essential systems to gather image and video data of terrain which are inaccessible and vulnerable. Moving Object Detection and Tracking (MODAT) framework modelled by high resolution computer vision and image processing techniques are used to create geo-spatial map and other image documents. The monitoring of the terrain objects, tracking of the moving objects and updating of real time position data facilitate 24-hour surveillance of the area of interest. These are independently operated, adopted in cluster and communicated in decentralized method to ensure optimum security and application flexibility. The automated MODAT framework operates under three modules such as image alignment, motion detection and object tracking module. The large computation of the image data is carried out through various image processing algorithm with reinforcement learning AI subset (*Ibrahim, et al., 2010*).

- **Earth Observation Satellite**

Earth Observation Satellite (EOS) is an invaluable intelligence collection system covering wide area of terrain thereby perform as strategic asset of any military. EOS can observe the terrain where the satellite images at different elevation are taken and sent back to central control station. After due processing, these images can be studied through ML about change of pattern of terrain configuration and provide alert about the potential intrusion across the border. The entire process of image capture, storage, processing and interpretation of the images with the current and previous setting are done autonomously by various AI subsets.

- **Electronic and Virtual Sources**

Apart from other traditional and existing intelligence sources, electronic and virtual sources are of utmost importance for MI. The digital signature and potential information appear in various electronic media and virtual information highway (Internet, social media networks and other media sources), can build a 360º perspective and assessment about any impending situation. Reinforcement of AI learning through supervised algorithm modelling framework can extract the required information from these medium. There is need for constant supervision by human agents which can be achieved by supervised learning program. The electronic sources over internet are one of the major information sources where ML would perform a significant role in detecting and extracting required information. It can sort and collect required information with self-automation process which is often overlooked by intelligence agents due to abundant volume of data. The sources of potential intelligence range from internet web sites, social media

platforms (Facebook, Twitter, Instagram etc), video sharing platform (YouTube, Vimeo, TikTok etc), news portal (national and international), media channel (national and international). The data from these sources often comes in unstructured image and voice data format. Diplomatic offices are one of the authentic sources that provides recent development of allied countries in respect to political, economic and military development which often comes in structured format. Global Military armament contract and transaction details can provide latest armament capabilities of potential adversaries. These are mainly structured data and the collection sources are often needed to be verified in Tier 2. Along with this, various military technology development programs can be sources of utmost importance to have an understanding of future development trend in military. These data are in structured format and often need verification in Tier 2.

- **Human Intelligence**

Human sources will remain the most important source of information as in vogue for BD Army. HUMINT can be collected through a variety of human and other sources. These can be categorized as Regular, Irregular, Specialized, On-Demand and Shared HUMINT. Regular HUMINT are collected from general collection sources which are trained and placed under regular employment principles. Irregular HUMINT are collected from the sources which needs verification regularly. These kind of sources must qualify the validation parameter set in Tier 3 under personality profile. Specialized HUMINT is collected from the highly classified sources which are often placed in hibernation state in places of interest that collects information based on self-actuation mechanism. The specialized sources are usually verified before placement but needs to match the pattern of activities which is carried out in Tier 3. On-Demand HUMINT are the extension of regular HUMINT where sources are often placed in certain circumstances for specific time frame. Shared HUMINT is the common intelligence often received from other organizations either on-demand or for common purpose. The mode of HUMINT comes in the form of written, oral and encoded format of data. This structured, semi-structured and even unstructured data can be analyzed through data mining, NLP and text analytics. Unstructured Information Management Architecture (UIMA) frame can be used in Tier 2 to process semi-structured and unstructured data and create a common structured database.

Tier 2 (Storage & Processing)

In Tier 2, data storage, data processing, data flow and data processing hardware synchronization will take place. Data from various sources can be stored in decentralized server which can transfer data to central database. The on-demand

data can also be extracted through military cloud network. Data processing can be carried out through ML algorithm and AI subsets. For structured data, supervised learning system can be used with limited autonomy. For image and voice data, reinforcement learning can be used so that it can learn from the environment and adaptive configuration with situational experience can be inherited. NLP can be applied for all kinds of voice recognition, voice interpretation and voice orientation. Storage of electronic sources can be achieved through neural network within Big Data framework. Data flow can be carried out through secured fiber optic network. Moreover, the mechanical collection sources can be interconnected by IoT so that flow of data and control of devices can be performed instantaneously and centrally.

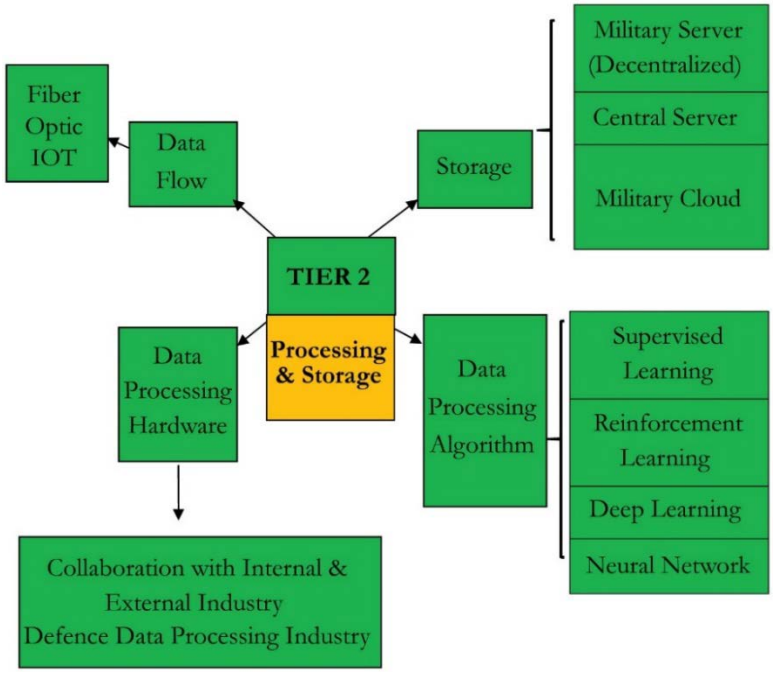

***Figure 5**: Tier 2 (Storage & Processing)*

ML Processing of Intelligence Data

The data thus derived through various collection sources will form the framework of Big Data. The ever changing landscape of data structure in the digital format needs ML based algorithm for digital data processing which is an evolutionary field of study. Data processing by ML algorithm is carried out by data selection (structured, semi-structured and unstructured), data processing, data transformation, data output and finally data storage. There are various methods of ML algorithm in the growing data science field. Among these, regression,

classification, time series analysis, topic modelling, cluster analysis, collaborative filtering, association rules and dimensionality reduction are popular and are being used widely in both military and commercial purposes (*Bhatnagar, 2018*). While using ML algorithm for data processing, there are three learning types of ML technologies that can be adopted. The three sub domains of ML which would be used extensively are supervised learning, reinforcement learning and automated/unsupervised learning. Among these sub-domains of ML, supervised learning is used for classification and estimation of the data processing tasks that use Neural Network, Bayesian Network, Naive Bayes, Support Vector Machine and Markov Model Algorithm. Reinforcement learning is used for developing decision making tasks from the intelligence data sets. Reinforcement learning uses Q-Learning, R-learning, TD learning and Sarsa learning algorithm. Unsupervised learning mainly functions for producing clustering of data for making future prediction events through trend analysis of situation. It uses k means, Gaussian model, X means and Dirichlet process model algorithm (*Bhatnagar, 2018*). There are Big Data framework for processing and analyzing the intelligence data generated from various sources. Among many, Hadoop framework for intelligence data processing would serve the best for MI analysis (*Chowdhury, n.d.*).

Tier 3 (Fusing & Profiling)

Tier 3 functions by fusing various dataset so that personality model, dynamic personality profile, decision model, dynamic situation model and integrated early warning (EW) system can be developed. Along with HUMINT; collecting, collaborating and fusing individual person's interaction in Online Social Network (OSN) and other websites in the internal dynamic personality profile of military and non-military persons of interest can be created. This selection of person may range from adversary's military and non-military leadership along with suspected actors of non-traditional threat groups. According to (*Souri, et al., 2018*), Eysenk three-factor model [Psychoticism, Extroversion, Neuroticism (PEN) model], Big Five model and Alternative Five model are widely used model to describe personality profile. For this, ML algorithms such as Naive Bayes, Decision Trees, Neural Network and Support Vector Machine are used to analyze the online datasets. The personality profile which will be updated and reframed regularly can be performed by reinforcement learning of AI subsets. Based on a number of personality profile of a person under various circumstances as per his behavior reaction, personality model is prepared. This personality model will be used extensively about developing numerous decision models which will be invaluable ingredients to strategic and operational leadership. Similarly, based on various activities under a certain situation, the combination of activity elements can be fused together in random manner to predict upcoming situation. Thus, fusing of situation elements will construct dynamic situation model using adaptive learning method of ML. All these models will help creating integrated EW about person of interest and any situation for senior leadership in particular and forces in general.

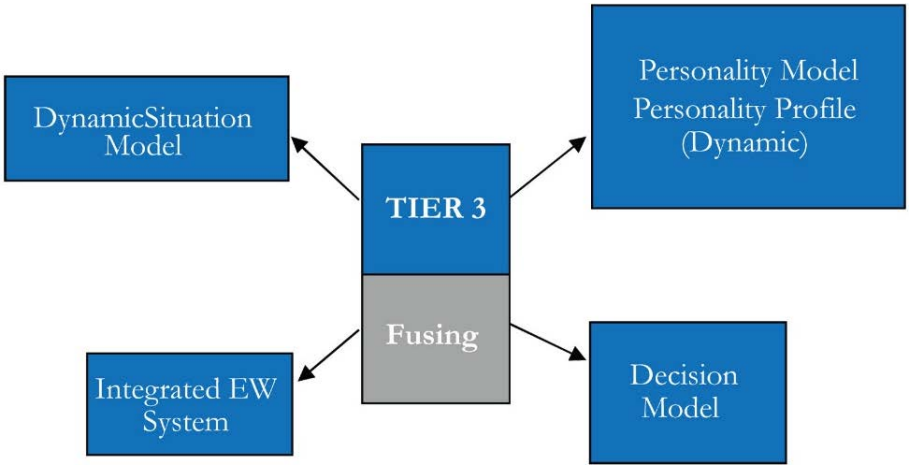

Figure 6: Tier 3 (Fusing & Profiling)

Characteristics of Data Fusion of MI Information

- Data fusion is the method by ML to process all types of data into a usable format and prepare a unified picture of ongoing and future situation. ML generally conducts this data fusion through data imperfection, data correlation, data inconsistency and disparateness of data. Data fusion is the multi-level, multifaceted process handling the automatic detection, association, correlation, estimation and combination of data and information from several sources (*F.E.White, 1991*). It is the process by which information in transformed from different sources and different points in time and space. This process improves the detection capability, reliability, reduce data ambiguity and extend the spatial and temporal coverage ranging from boundary of the country to area of points of interest. JDL model is one of the most common and popular fusion system which is based on the input structural data and produce output in the military domain through four increasing levels of abstraction as object, impact, situation and process refinement. JDL model has mainly focused on input-output data more than that of processing. On the contrary, Dasarthy's framework allows both input/output data flow and functional process (*Dasarathy, 1994*). Based on uncertainties of events in global, regional and national level, often MI needs to accommodate random sets of information. It would be useful to build numerous decision model based on these random sets of data. In this regard, Goodman's (*Goodman, 1997*) random sets can be of very useful process which has the ability to combine decision

uncertainties as well as presenting generic pattern of uncertainty options.

- Data fusion technology for MI data transformation must undergo a robust adaptive programming framework that can address imperfection of data type, diversity of data type, variety of sensor technologies and nature & type of operating environment.
- Data fusion algorithm need to be capable of withstanding imperfect, imprecise, data type as collected both from fields by agents and by sensors. It should also be able to export the redundant data thereby reducing the noise in measurement.
- Data fusion system should be capable of avoiding counter intuitive results and able to treat highly conflicting data with due attention thus eliminating enhances of decision errors.
- Data fusion scheme should be able to handle both homogeneous and heterogeneous data as audio, video, radio signal and other forms of signal sources.
- Data fusion system need to overcome the calibration error induced by individual sensor modes through sensor registration as the transfer of data would take place from a common frame which collect data from individual sensor's local frame. This processing can be done both in a centralized and decentralized manner. The decentralized fusion process can be useful in remote inaccessible terrain where wireless sensor network will have to be established.
- The data fusion method should address multiple time scales to deal with multiple variation of time scale on which sensor would receive and send data. As the data flow will be through variable routes, there may be chances of out-of-sequence arrival of data. To address such potential pitfall of performance variation, the fusion center should have distributed fusion settings.
- The fusion process must be operated through reinforcement learning method so that it can accommodate changes quickly and update accordingly thus showing the dynamic phenomena.

Data Fusion Methodologies

Real time data fusion system will face numerous challenges as the methodology is yet under exploration. The main challenges comes from unstructured, incomplete and imprecise data. It is evident that MI data would never come as complete structured format as the forecasted sources range from human sensors, drones, satellites and other virtual & online platforms. Khaleghi *(Khaleghi, et al., 2011)* depicted several data related challenges in data fusion system. The taxonomy of data fusion methodologies is shown in Figure 7

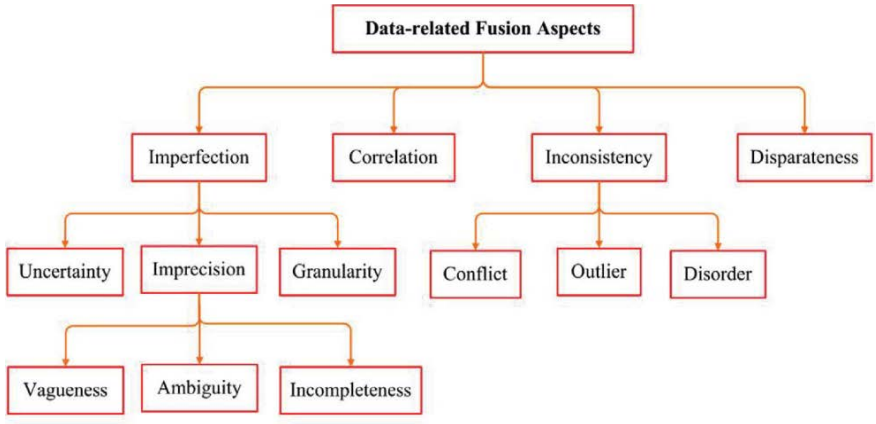

***Figure 7**: Taxonomy of Data Fusion Methodologies (Khaleghi, et al., 2011)*

Regardless of the data structure, ML can use data fusion algorithm and create data structure in a number of data model for various requirement of MI. Among these, the most fundamental challenging problem for data fusion system is data imperfection which comes in the form of uncertainty, ambiguity vagueness, incompleteness and granularity. There are numerous suggested imperfect data fusion framework to address such limitations. The popular data fusion framework is Probabilistic, Evidential, Fuzzy Reasoning, Possibilistic, Rough set theoretic, Hybridization and Random set theoretic fusion. This framework has the capabilities to treat data uncertainty, fusion of ambiguous data, handling of vague data, handling of incomplete data and fusion of imperfect data.

Tier 4 (Data Sharing)

Tier 4 is the data sharing platform where completed situation models and integrated EW will be shared with internal and external stakeholders. This centralized data sharing platform will be connected to all the formation headquarters so that situation awareness can reach instantaneously. These can be connected through fiber optic network with separate communication hub to other organizations and stakeholders.

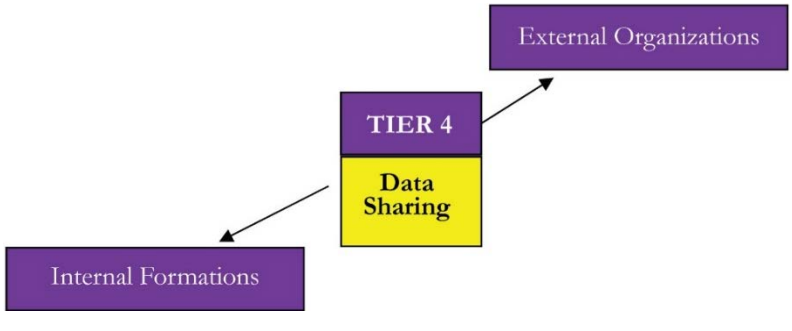

***Figure 8**: Tier 4 (Data Sharing)*

Military Cloud Computing in MI Fusion Process

Military Cloud Computing (MCC) can be a convenient on-demand shared network access for common intelligence data and resources. The vital accessibility function of MCC makes it reliable, durable and secured with military grade protection from cyber-attacks. It will offer a dynamic resource pool and storage facility for all intelligence big data and other resources so that any intelligence agent can get access to it at any time in any part of the world and at the same time can upload all kinds of data in any time. In this way, MI resources can be shared and accessible for 24 hours' time. The MCC can be constructed in 4 layers of individual decentralized functionality. Cheng & Liao (*Cheng & Liao, 2011*) named these as Resource layer, Service oriented architecture layer, Service oriented tool layer and Cloud computing application layer. The Resource layer will hold all the physical resources and logic resources. The physical resources include storage accessories, network equipment, physical database accessories, servers etc. The logic resources include application software and other related software. Service oriented architecture layer performs the sharing of resources as intelligence service, general service and specialty service. Service oriented tool layer provides the user interface and access interface, conducts simulation modeling and debugs the encrypted data.

Military Internet of Things for Intelligence Data Transfer

Military Internet of Things (MIoT) will be an emerging and essential system for connecting all the devices, sensors, drones, satellites and other collection devices under the same military grade network. It will interconnect both human and machines together promoting and exercising human-machine collaboration. MIoT will be comprised of all military platform in addition to collection devices so that the executive deployment instructions can also be passed. This will not only allow the continuous flow of information to the central database but also disseminate the outflow of information to the end users.

RECOMMENDATIONS

With the above discussion on various factors of incorporation of ML in MI process, following recommendations are made:

- ML based collection sources can be incorporated besides traditional collection sources of MI in the area of interest.
- Data fusion center can be introduced to combine and fuse all types of data to make unified intelligence picture.
- R&D can be initiated with collaboration with engineering institutions, government agencies and concerned industries to help promote own innovation and development of ML algorithm and supporting hardware.

- The time line of exploration of ML algorithm with related MI application and platforms can be planned to transform MI process towards human-machine collaboration spectrum.
- The Tiers of intelligence framework can be introduced within the MI framework so that synergistic efforts can bring out automation dividend.
- Security of information has to be ensured in every layer of sources with sufficient updated fire wall system.
- Alternative data storage need to be ensured in every tier of MI process.

CONCLUSION

ML, a subset of AI has been used extensively by militaries of developed and developing nations in their various military applications and war fighting platforms. Supporting this trend, developed countries have reoriented their intelligence collection and analysis process through ML to get more insights about the situation and analyze from all perspective to prepare intelligence database and product. The framework of military ISR incorporate spatial database, attribute database, case base, rule base and a knowledge repository which are intertwined process. The continuous coordination, revision, update and execution can be accelerated through automation with least error probability demands human-machine collaboration in the intelligence analysis framework where the application of ML is evident. Geographic information system (GIS) and knowledge based decision support system (KBDSS) are being used to integrate the function of decision support and knowledge management to enhance both explicit and tacit knowledge base which are the two forms of intelligence knowledge approaches. Incorporation of intelligent operation support system (IOSS) structure through which rich knowledge representation is done by hybrid reasoning strategy which proved its applicability in production decision system. The hierarchy and configuration of MI is broadly divided into three levels; first level consists of operational and tactical intelligence collection organizations and units, second level conducts different intelligence analysis of the data and information provided by the collection organization and units where third level is the user organization, higher headquarters and senior leadership who often place the requirement of intelligence. The data collection and analysis steps in first and second level can incorporate automation by incorporation AI based functioning system.

Recent development in global military application of ML in MI ranges from Multi-Domain Command and Control System (MDC2), Border Surveillance System (BSS), Acoustic Detector, Video Surveillance, Deep Learning for Behavior Recognition and Information extraction through Semantic World Modelling operate under supervised, reinforcement and deep learning approaches to analyze information from Human intelligence (HUMINT), Imagery intelligence (IMINT), Open source intelligence (OMINT), Virtual source

intelligence (VIRINT) and many other sources. The ML algorithm models for MI analysis has been developed and few important achievements in this sector are Active Learning Support Vector Machine (ALVSM), Agent Based Intelligent System Modelling, Ambient Intelligence (AmI), Facial Expression Recognition System (FERS), Data Mining and Data Warehousing, Geographical Information System (GIS) with Sensors and Sensors Based Cognitive Platform.

The Collection, Processing and Analysis (CPA) stages of MI are crucial and need attention from technological aspect as the sheer volume of handing and processing have already exceeded the human capacity as the types of collection sources ranges from sensors, aerial system, satellites, radio signals, open source internet, social network, different organizations, agents, adversaries and many more. In peace time, Non-Traditional Security (NTS) threat remained high throughout the last decade and it has already appeared as new security concern. In war time, under active battlefield scenario, continuous reconnaissance and surveillance are essential and integral part of any operational activities. In battlefield environment, these data from various sources are added to the previous digital database, hence producing massive flow of data. ML system can easily sift through billions of bytes of data and captures the needed types of data to create meaningful information for MI. While ML is applied in collection of data, the system prepares the data by correct identification, locating, profiling, sourcing, integrating, cleansing and storing through data mining. There are various ML approaches which utilizes complex algorithm and predictive modelling for carrying out data analysis for predicting future outcomes. Supervised Learning works with both training and test data set where training dataset can be used to train the ML system by MI agents. Unsupervised Learning is used to find the data structure pattern in the dataset. Reinforcement Learning uses complex algorithm to learn from its experience and redesign its program for analysis of the forecasted situation. Deep Learning function through artificial neural networks where the data are preserved in a number of layers so as to be used through layers of variable data interfaces. In automation of MI, it is found that incorporation of AI brings most impact in processing and analysis stages of MI process. The intrinsic value of ML will thus come for MI organization in promoting and utilizing 'automation dividend' so that agents can use their saved time in other high-priority tasks.

Peace time surveillance is one of the major functions of MI department. Besides manual and human collection of information, sensors, UAVs and EOS can play a dramatic role in collecting large volumes of data and information. Smart security sensors can be interconnected through IoT and can form a large surveillance network system across the border of the country. Surveillance Unmanned Aerial Vehicle (UAV) serves as one of the essential systems to gather image and video data of terrain which are inaccessible and vulnerable through Moving Object Detection and Tracking (MODAT) framework. Earth Observation Satellites (EOS) is an invaluable intelligence collection system covering wide area of terrain

thereby performs as strategic asset of any military. Reinforcement AI learning through supervised algorithm modelling framework can extract the required information from electronic and virtual sources. Data processing by ML algorithm is carried out by data selection (structured, semi-structured and unstructured), data processing, data transformation, data output and finally data storage. Hadoop framework for intelligence data processing performs as Big Data framework for processing and analyzing the intelligence data generated from various sources. Data fusion is the method by ML to process all the types of data into a usable format and prepare a unified picture of ongoing and future situation. ML generally conducts this data fusion through data imperfection, data correlation, data inconsistency and disparateness of data. Among various fusion system, Joint Directors of Laboratories (JDL) model, Dasarthy's framework and Goodman's random sets perform all kinds of data fusion, feature fusion, decision fusion and information fusion. The popular data fusion methodologies are Probabilistic, Evidential, Fuzzy Reasoning, Possibilistic, Rough set theoretic, Hybridization and Random set theoretic fusion. The synthesis of data is an essential step of intelligence data analysis so that it can combine all the disparate elements together as derived from various collection sources for developing intelligence summary of a single event and situation. Military Cloud Computing (MCC) can be a convenient on-demand shared network access for common intelligence data and resources for its dynamic resource pool and storage facility for all intelligence big data and other resources so that any intelligence agent can get access to it at any time in any part of the world and at the same time can upload all kinds of data in any time.

Four Tiers of functionality as data collection, data storage & processing, data fusing and profiling and finally data sharing functions can be developed through functioning of ML by supervised and reinforcement learning method. This will allow expanding the reach of MI all around and physical and virtual areas of interest can be brought under surveillance. So incorporation of ML will facilitate the automation of MI collection and analysis process so that all the corners of own points of interest can be looked into and strategic, operational and tactical leaders are aware of what is coming next.

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THE NEW REGIONAL RACE OF VACCINE DIPLOMACY AND THE OPPORTUNITY FOR BANGLADESH

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Abstract: 'The Coronavirus Vaccine', one of the world's most coveted commodities, has become the new currency for international diplomacy. While the western world has resorted to staunch Vaccine Nationalism to preserve enough vaccines for their population, in the east, the race is for giving them away. India and China came forward in aid of the developing and poor nations while the rich western countries have been scooping up the world's supplies. However, observers and scholars indicate that there is always an underlying race of regional supremacy behind this soft power diplomacy of the regional powers. Initially, India took the lead. Since March 2021, the intensity of the COVID situation in India turned the tide and offered China and Russia the opportunity to steer the world's vaccine diplomacy. Recently, the USA, UK, Canada, Japan and a few other western countries have also come up with donations through the COVAX initiative. Bangladesh, an aspiring middle-income economy, is struck by COVID-19. The evolving situation is a litmus test for Bangladesh's diplomatic skills, and the Bangladesh government is dealing with sheer pragmatism in striking a balance with all regional and extra-regional actors. Bangladesh is making vigorous efforts to explore all possible sources for the procurement of COVID-19 vaccines. However, Bangladesh should also emphasize local production as well as the development of its local vaccines. Strong and relentless diplomatic persuasion should continue to acquire enough vaccines from the manufacturing countries and organizations, while constantly hammering to secure the promised ones from different sources.

Keywords: *Vaccine Nationalism; Vaccine Diplomacy; Vaccine Leaders; Health Silk Road; Vaccine Maitri.*

INTRODUCTION

"The pandemic is a stark reminder that our fates are interconnected and that no one is secured until everyone is secured."

~Hon'ble Prime Minister Sheikh Hasina (*Ministry of Foreign Affairs, 2020*)

According to the Global Health Institute of Duke University, developed countries like Canada, the USA, and the UK, with only 16 per cent of the world's population, have secured 60 per cent of global vaccine supplies for themselves (*Tharoor, 2021*). While the westerners are struggling to accumulate the vaccination doses, in the east, the race is for giving them away. 'The Coronavirus Vaccine', one of the world's most coveted commodities, has now become the new currency for international diplomacy. Nations possessing means of vaccine production and larger stocks are capitalizing on it for expanding their influence in their respective regions and beyond. Thus, over the last year, the Sino-Indian conflict for regional supremacy has evolved into a scramble to send COVID-19 vaccine doses across the world (*Safi, 2021*). Leaving aside their border skirmishes and high-altitude standoffs, they have found a new diplomatic battleground called 'Vaccine Diplomacy' (*Gilani, 2021*).

Both these Asian giants have stepped into this battleground left by the westerners and got a chance to bolster their global image and showcase their soft power. They came forward at a time when the rich western counties have been scooping up the world's supplies and the poorer countries have been trying desperately to get their own. It was a disparity that, according to the World Health Organization (WHO), had put the world "on the brink of a catastrophic moral failure." On the contrary, when most of the South Asian countries, with limited healthcare facilities, were eager to get whatever was offered, these donors came forward not only for the sake of humanity but also to strike a favourable balance in the regional and extra-regional diplomacy (*Mashal & Yee, 2021*).

Initially, with the unmatched prowess of manufacturing vaccines, India took the lead in this diplomatic race leaving behind China and Russia. Except for Pakistan, India had sent vaccines to all the South Asian countries through donations and exports. Since March 2021, with the evolution of the Delta variant, there was an enormous rise in the rate of detection and deaths putting India in an unimaginable difficulty. This situation created opportunities for China and Russia to snap up the steering of world vaccine diplomacy and to control the vaccine supplies across the world. China grabbed the initiative to supply to around 90 countries, while Russia planned to support around 70 countries. Moreover, Russia appears to be both an ally and a competitor of China in this regard, although both of them despise their endeavours to be termed as 'Vaccine Diplomacy'.

After a long absence, followed by widespread criticisms, the USA and UK also came up with their donations through the COVAX initiative. Oxford-

AstraZeneca of India, Russia's Sputnik V, China's Sinopharm and Sinovac, and USA's Moderna and Pfizer are considered to be the most widely circulated vaccines and extensively used tools for diplomacy. Of late, although not directly involved in the diplomatic race, developed countries like Japan, Canada, Germany and a few other European countries have also come forward to promote vaccine donations.

This is how global politics is unpredictable and challenging to assess with its frequent twists and turns. Bangladesh, an aspiring middle-income economy of South Asia is hit hard by COVID-19 and is walking on a diplomatic tightrope to maintain a balance with all regional and extra-regional actors. The question that underlies the complex gamut of world vaccine diplomacy and the fierce diplomatic race among the regional powers is: How should Bangladesh position itself and act in a way to reap maximum benefit, not only in terms of acquiring vaccines for its huge population, but also to find a way out for post-pandemic economic recovery. Against this backdrop, this paper attempts to illustrate the concept of vaccine nationalism and vaccine diplomacy vis-à-vis vaccine empathy; and discuss the regional race of vaccine diplomacy with an emphasis on the stake for Bangladesh in it. It has been developed through qualitative research methodology. Content analyses have been carried out both on primary and secondary sources to collect firsthand data and to get well-researched findings respectively.

The subject under study being a current issue with evolving perspectives and rapidly changing scenarios, it is challenging to define a purview and timeframe of the study. Nevertheless, the current date has been considered as the timeline for collecting various related statistics and consideration of the fresh perspectives and latest available data has been provided as far as possible. While discussing the regional vaccine diplomacy and the role of regional actors, the focus of the paper has been kept limited mostly to the South and East Asian region.

'VACCINE DIPLOMACY' TURNS INTO A GEOPOLITICAL RACE

Amidst the rising death toll arising from COVID-19 pandemic, 'Vaccine Diplomacy' is turning into a key component of geopolitics. Several countries including China, Russia, and India, have intensely indulged in vaccine diplomacy. Opposed to the unequal distribution of vaccines across the globe (widely known as 'Vaccine Apartheid'), this new diplomatic tool ought to have a substantial impact on regional and international politics (*Chainferber, 2021*). Nations have used their ability to procure, produce and distribute vaccines as a measure of state power, both domestically and internationally (*Chatterjee, et al., 2021*).

Having the US non-responsive and India caught in peril, Moscow and Beijing set out to fill the vacuum through bilateral accords. India's inability to provide the promised vaccines to its neighbours, at a time of their critical need, forced them to desperately look for alternative sources. Under the 'Global Public Good' pledge, China stepped up with its activities to ensure that Chinese-made vaccines are available in developing and least-developed countries at an affordable price. This diplomacy is intended to complement China's deep pocket diplomacy in India's neighbourhood. To expand and solidify its regional leadership position, China also launched a new platform called 'China-South Asia Platform for COVID-19 Consultation, Cooperation, and Post-Pandemic Economic Recovery'. Interestingly, Middle Eastern countries, wealthy enough to afford the costlier Pfizer and Moderna vaccines, have also opted to 'balance' their purchases of AstraZeneca doses by placing orders from China and Russia (*Chowdhury, 2021*).

It is noteworthy that recently Sino-Indian chemistry became critical over India's joining the 'Quad' (Quadrilateral Security Dialogue), considered to be the US-led anti-China alliance to check China's growing influence in the Asia-Pacific. Yet the US initially gave a cold shoulder to India's struggle against the COVID-19 surge due to its purchase of S-400 missiles from Russia. However, when China sprang with its vaccine diplomacy, Quad members and their affiliates started backing India to strike a balance against China.

THE CONSTRUCT OF THE IDEA OF VACCINE NATIONALISM AND VACCINE DIPLOMACY

Conceptualization of the Ideas

'Vaccine Nationalism versus Vaccine Diplomacy' is a widely discussed and debated contemporary topic. Both these ideas, bounded by different kinds of interests, somehow stand opposite to each other, while complementing each other. Generally, one is about securing the well-being of own population with topmost priority and at any cost, while the other one is driven by different motivations (ethical, diplomatic, transactional, or a mix) to share vaccines, subsidize the price or even waive patent protections for other countries.

'Vaccine Nationalism' occurs when governments sign agreements with pharmaceutical manufacturers to amass sufficient number of vaccines for their populations while preventing their export to other countries. Increasing emphasis on public health as an issue of national security has compelled the governments to consider the availability of vaccines as a top priority. Fear of not having enough supplies led the western governments to impose export restrictions while liberalizing imports of crucial medical supplies. This resulted in shortages of vaccine and emergency medical supplies in developing countries (*Hafner, et al., 2020*).

The changing US-China relationship has further complicated the dynamics of vaccine nationalism while the epicenters of the pandemic formed among the high-income and major emerging economies. As a result, COVID-19 vaccine R&D has prompted a fierce geopolitical race between powerful countries (*Zhou, 2021*). Out of uncertainty about which particular vaccine would end up being suitable and approved, countries like Canada, the UK, and the US ordered doses from several candidate vaccines, in enough number to vaccinate their entire population over four to six times (*Garnier, 2021*). By February 2021, the US had secured 800 million doses of at least six vaccines in development, with an option to buy about one billion more (*Khan, 2021*). However, Canada topped the list, pre-ordering vaccine doses sufficient to vaccinate its population for nine times, while the UK had over six times of the total need of its population (*Khan & Dhama, 2021*).

'Vaccine Nationalism' can be defined as 'the act of a nation, with the means of production and procurement of vaccines, to accumulate the number of doses outnumbering its population'. Besides instigating an unhealthy race between the west and the east for pioneering the vaccine development, it also generated severe consequences by driving up the vaccine price and related materials and, at the same time, paved the way for 'Vaccine Diplomacy'. On the other hand, countries pursuing 'Vaccine Diplomacy' had their different diplomatic target populations with varying levels and degrees of favour depending upon bilateral ties and interests. Pakistan is the recipient of the first and largest donation from China, while Bangladesh received the same from India. The US also prioritized Canada and Mexico for its supplies favouring the proximate neighbours over distant needs. A classic victim of Vaccine Nationalism is Ukraine which, deserted by European allies and with complicated relations with Russia, had to ultimately turn to China for emergency vaccines (*Standish, 2021*).

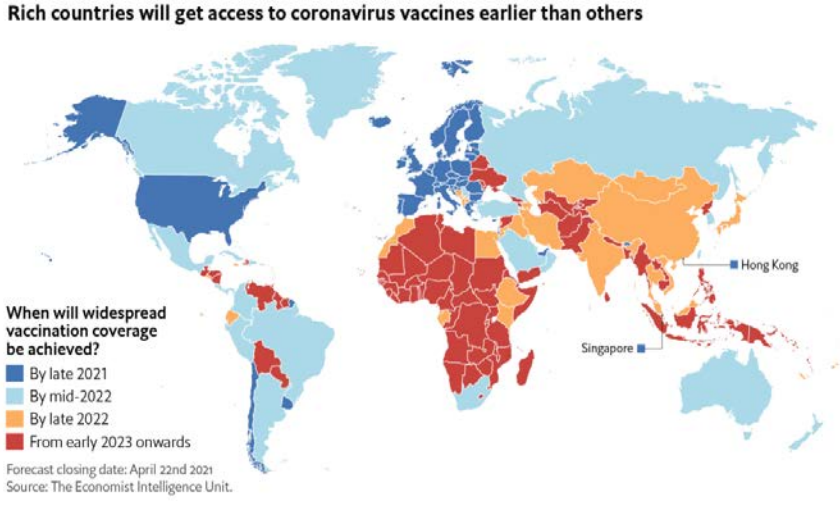

***Figure 1**: Access to COVID-19 Vaccination* (*Economist Intelligence Unit, 2021*)

Phases of Vaccine Nationalism

In expert opinion, the challenge is to explore the possibility of vaccine nationalism-vaccine diplomacy synthesis to yield a response that surrounds situational ethics and relative gains. Generally, 'Vaccine Nationalism' has acquired a negative connotation representing a grasping and greedy approach while remaining indifferent to others' sufferings and needs (*Gvosdev, 2021*). However, the idea can be conceived in three reinforcing but distinct phases: firstly, predatory vaccine nationalism, commandeering and hoarding of vaccines exclusively for own populations even by disrupting global supply chains and conserving the patent. This led to the next phase of 'benign vaccine nationalism', when the governments resorting to vaccine nationalism continue to prioritize their populations' access to vaccines while adopting a restrained approach to provide vaccine doses to the immediate neighbourhood. The third phase yields an 'ultra-vaccine diplomacy' focusing on the global vaccine needs, waiving intellectual property and supporting poorer nations in capacity building (*Owusu-Antwi, 2021*).

Concerns about Vaccine Nationalism

Tedros Adhanom Ghebreyesus, the Director-General of World Health Organization (WHO) depreciated Vaccine Nationalism by saying, "We need to prevent vaccine nationalism. Whilst there is a wish amongst leaders to protect their people first, the response to this pandemic has to be collective" (*Khan, 2021*). The race for developing vaccines within the shortest possible time can also be attributed to the nationalist tendencies of vaccine-producing countries like the US, Russia and China. While some of these countries are involved in vaccine diplomacy in their targeted regions and with specific countries, the manufacturing companies are focused on profiteering (*Hossain, 2021*). Thus, millions of people from the least developed nations, who neither has means nor has an alliance with a vaccine leader, have been prey to both vaccine nationalism and vaccine diplomacy.

The artificial crises resulted from 'Vaccine Nationalism' exposed a few distressful developments: firstly, a new divide between the Global North and Global South; secondly, powerful vaccine developing and manufacturing countries are the key actors in both vaccine nationalism and vaccine diplomacy; and thirdly, the dominance of the market mechanism indicating the profit-seeking and interest-centric attitudes of vaccine manufacturers. Moreover, a rising trend of private sector involvement in the vaccine sector cannot also go unnoticed (*Hossain, 2021*).

At the 75th session of the UN General Assembly (UNGA 75) in 2020, Hon'ble Prime Minister Sheikh Hasina urged the world, "It is imperative to treat the vaccine as a 'global public good'. We need to ensure the timely availability of this vaccine to all countries at the same time. If we are provided with the

technical know-how and patents, the pharmaceutical industry of Bangladesh can go for vaccine production in mass-scale" (*Ministry of Foreign Affairs, 2020*).

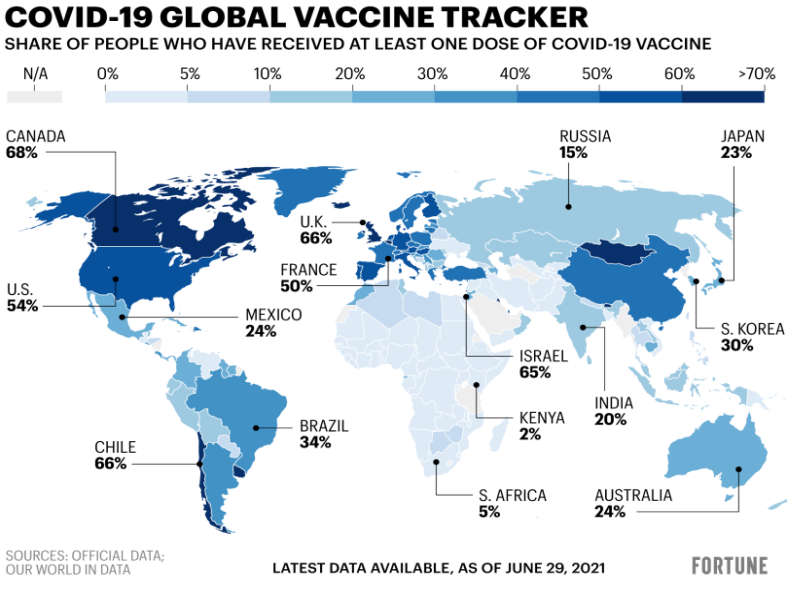

Figure 2: *Rate of Vaccination around the World* (*Fry & Rapp, 2021*)

Vaccine Empathy – Ensuring Equitable Distribution of the COVID-19 Vaccines Globally

Although safe and effective COVID-19 vaccines were developed in a record time, the virus has spread faster than the global distribution of vaccines. The vast majority of the vaccines have been administered in high- and upper-middle-income countries, which if distributed equitably, could cover all health workers and older people globally. The global failure to share vaccines equitably has already taken its toll on some of the poorest parts of the world. According to WHO, there are enough doses of vaccines globally to drive down transmission and worldwide equitable distribution is the best hope for taming the coronavirus pandemic and securing a global economic recovery. The WHO Strategy to Achieve Global COVID-19 Vaccination by mid-2022 outlines the roadmap to achieve a target of vaccinating 40% of the population of every country by the end of this year, and 70% by the middle of next year (*World Health Organization, 2021*).

The Access to COVID-19 Tools (ACT) Accelerator is a ground-breaking global collaboration launched in April 2020 to accelerate the development, production, and equitable access to COVID-19 tests, treatments, and vaccines. COVAX is one of three pillars of the ACT Accelerator, co-led by the Coalition for

Epidemic Preparedness Innovations (CEPI), Global Alliance for Vaccines and Immunizations (GAVI) and the World Health Organization (WHO), alongside key delivery partner UNICEF. Its aim is to accelerate the development and manufacture of COVID-19 vaccines, and to guarantee fair and equitable access for every country in the world. Coordinated by GAVI, the Vaccine Alliance, CEPI and the WHO, COVAX aims to achieve this by acting as a platform that will support the research, development and manufacturing of a wide range of COVID-19 vaccine candidates, and negotiate their pricing. All participating countries, regardless of income levels, will have equal access to these vaccines once they are developed. The initial aim is set to have 2 billion doses available by the end of 2021, which should be enough to protect high risk and vulnerable people, as well as frontline healthcare workers (*Berkley, 2020*).

INDIA'S VACCINE DIPLOMACY

Pursuing the Dream of Global Leadership

India, with its formidable vaccine manufacturing capacity and license to produce Covishield of Oxford-AstraZeneca has donated nearly 60 million doses to her diplomatic target audiences with the crates bearing the message 'Gift from the people and government of India' (*Mashal & Yee, 2021*). India is trying to make good use of its vaccine diplomacy to earn recognition as a global leader. Indian Prime Minister Narendra Modi tweeted, "We are all together in the fight against this pandemic. India is committed to sharing resources, experiences, and knowledge for global good" (*Tharoor, 2021*).

India started preparing the ground, even before COVID-19 vaccines were developed, by supplying test kits as well as emergency medicines and pharmaceutical products to around 100 countries. It quietly started pursuing 'Vaccine Diplomacy' at a time when global cooperation in this area was minimal and WHO's initiatives were yet to take off. Under the 'Vaccine Maitri' (Vaccine Friendship) campaign, it had shipped millions of doses of Covishield to some 60 countries including most of her neighbours like Afghanistan, Bangladesh, Bhutan, Sri Lanka, the Maldives, Myanmar and Nepal. India also sent its vaccines to Seychelles, Cambodia, Mongolia, the Caribbean and African countries as well as to the richer countries like UK and Canada (*Tharoor, 2021*).

Between September 2020 and February 2021, there was a sharp decline in COVID-19 cases in India, while her two COVID vaccine manufacturers, Serum Institute of India (SII) and Bharat Biotech were producing four million doses a day. But by the end of January 2021, India was able to administer only 0.5 doses per day to its population. Thus, piling up of the excess vaccine doses, some of which were about to expire, provided India with the leverage to pursue her vaccine diplomacy (*Chaudhury, 2021*). In the face of vaccine nationalism in the West, the Indian government took over the leadership role by donating vaccines

to its neighbours and exporting even to distant countries like Brazil and Morocco.

New Diplomatic Weapon against China

In mid-January 2021, as India announced a donation of 10 to 20 million vaccine doses to its neighbours, a headline splashed on their national TV channel: "Some Spread Disease, Some Offer Cure". Being the largest global producer of vaccines, India utilized this soft power as a diplomatic tool to overshadow China's economic and geopolitical dominance in the neighbourhood and beyond. The 'Vaccine Maitri' campaign has allowed it certain diplomatic leverage, after years of watching China make political gains by wooing its neighbours with big pocket offers, that India struggled to match due to its layered bureaucracy and a weaker economy. One of India's largest donations had been to Nepal, where India's relationship plummeted to new lows in recent months with the country increasingly falling under China's politico-strategic influence (*Mashal & Yee, 2021*). India also sent vaccines to Afghanistan. Sri Lanka, where both India and China are vying for a foothold, has received doses from both countries (*Gilani, 2021*). However, Bangladesh received the largest amount of whatever India sent abroad as gifts and exports.

When the US could not extend vaccine support to the rest of the world because of its government policy driven by domestic requirements, India had taken a different stance despite having the second-highest number of COVID-19 cases. "Acting East. Acting fast," said S. Jaishankar, India's Minister for External Affairs, announcing the arrival of 1.5 million doses in Myanmar, a closer ally to China (*Mashal & Yee, 2021*). India had donated 6.47 million doses to Southeast Asian countries, including 100,000 doses to Cambodia, known to be China's most reliable ally in the East. It also supplied vaccines to Mongolia and the Philippines (*Gilani, 2021*) within the Chinese sphere of influence (*Wishnick, 2021*).

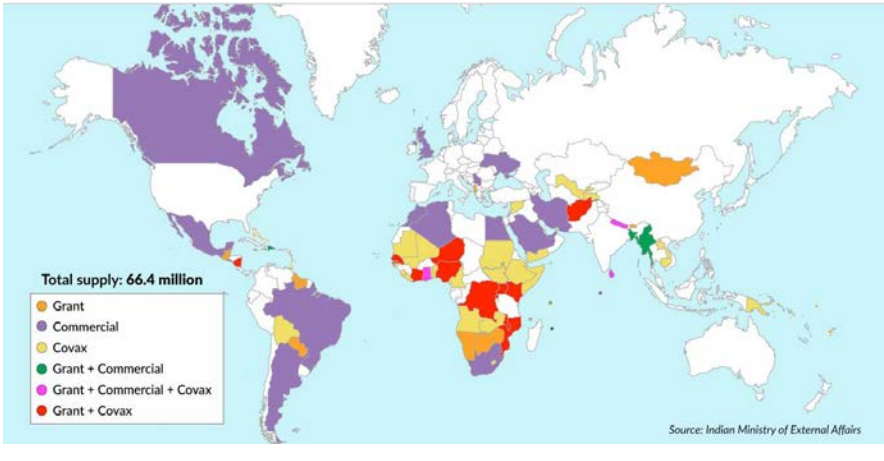

Figure 3: *Destinations of Indian Vaccines till March 2021*(*Kapoor, 2021*)

According to Shashi Tharoor, India overshadowed China as a provider of affordable and accessible vaccines to the Global South. Opposed to the controversy over China's secrecy in releasing data about its vaccines, India organized visits for foreign ambassadors at its pharmaceutical factories in Pune and Hyderabad (*Tharoor, 2021*). The SII also pledged 200 million doses to COVAX, when China pledged only 10 million. According to the latest statistics published on the Indian Ministry of External Affairs website, India has dispatched a total of 94.5418 million vaccines all across the world, including 12.727 as donation, 54.7358 million as export, and 27.079 million as contribution to the COVAX. The state of Indian vaccine supplies to its neighbourhood is as follows:

Table 1: *Indian Vaccine Supplies to East and South-East Asia (Updated on 12 December 2021)* (*Ministry of External Affairs, India, 2021*)

Country	Amount of Vaccine (million)			
	Donation	Export	COVAX	Total
Bangladesh	3.300	15.0008	3.5000	21.8008
Myanmar	2.700	2.0000	-	4.7000
Nepal	1.112	2.0000	2.6455	5.7575
Bhutan	0.550	-	-	0.5500
Maldives	0.200	0.1000	0.0120	0.3120
Sri Lanka	0.500	0.5000	0.2640	1.2640
Afghanistan	0.500	-	0.4680	0.9680
Mongolia	0.15	-	-	0.150
Cambodia	-	-	0.324	0.324

Criticisms against India's Vaccine Diplomacy

"Modi's vaccine diplomacy is all about leveraging our progress in science and pharma and its priority is the neighbourhood," boasted former Indian diplomat Veena Sikri (*Bhaumik, 2021*). By mid-April 2021, India had dispatched several million doses of Covishield vaccines as gifts, exports and contributions to COVAX. But in the same month the second wave of the virus hit India very hard compelling her to withhold all exports. Its failure to anticipate the devastation of the second wave and prepare accordingly caused collateral damage to the neighbours like Bangladesh, Nepal, Maldives and Sri Lanka, who relied heavily on Indian vaccines. Consequently, the goodwill India had initially generated with 'Vaccine Maitri' swiftly evaporated. Experts think that ignoring warnings of the second wave, a premature declaration of victory over the pandemic and gross complacency on the vaccine availability were some of the reasons for such a disaster. Ironically, India too had to find alternative sources of vaccines from other countries, with External Affairs Minister Jaishankar himself making a five-day visit to the US (*Chandra, 2021*).

While initially many Indian analysts claimed that the donation of vaccines to foreign countries was India's diplomatic triumph and display of soft power, later

many also complained that this generosity had deprived millions of Indians of their rightful vaccine doses costing many Indian lives. The country lagged behind its target of immunizing 300 million people by August 2021 amidst the mounting concerns about the emergence of new COVID-19 variants that may not respond to existing vaccines (*Tharoor, 2021*). "I don't spite our Covid-19 vaccine diplomacy, but where is my vaccine?" a distinguished Indian Citizen Twitted from his account. "Why can't the world's pharmacy provide vaccines to its citizens?" (*Safi, 2021*)

The changed scenario led to an outpouring of criticisms against India, and China had swiftly seized the opportunity of offering India's neighbours supplies of vaccines. China's Sinopharm vaccines made its way to Nepal, Bangladesh, Sri Lanka and the Maldives, with the supplies being a mix of donations and commercial sales. It is yet another instance of the dragon swiftly stepping into a vacuum left by the lumbering elephant (*Chandra, 2021*). Some analysts also say that the impact of Indian vaccine diplomacy will be short-lived unless New Delhi follows this with more substantive measures like investments, development aid and strategic tie-ups (*Bhaumik, 2021*).

CHINA'S VACCINE DIPLOMACY

Health Silk Road

In May 2020, at the height of the COVID-19 pandemic, Chinese President Xi Jinping declared that his country would soon provide safe and effective vaccines as a 'global public good', especially to the developing world (*Heydarian, 2021*). In a June 2020 White Paper on COVID-19, the Chinese government outlined its aim to develop a 'global public health' system that will benefit all of humanity, a goal patterned on the 'community of common destiny' long espoused by Xi Jinping as China's overall global governance objective. For China, providing vaccines to other countries is a key component of its efforts to reshape the pandemic's narrative to be remembered for the 'Health Silk Road', not the rumour of its role in the pandemic's origin and spread (*Wishnick, 2021*). However, the Chinese government opposes the term 'vaccine diplomacy', arguing that any responsible great power must distribute essential goods at a time of crisis (*Ioannou, 2021*).

A report by the Economist Intelligence Unit (EIU) predicted that most developing countries will not be able to inoculate their citizens until early 2022 and in some of the countries, vaccination coverage may not be possible until 2023 (*Economist Daily Chart, 2021*). The vaccine inequality mostly affected poorer countries, which paved the way for China to strengthen its image and influence as a multilateral power and the frontrunner of the global South. Vaccine diplomacy brought an opportunity to solidify China's footprint in Latin America, South East Asia and Africa, where the western powers failed to execute a timely response. To build its position as a global leader in the fight

against the pandemic, the Chinese government promoted the concept of Health Silk Road, an extension of the Belt and Road Initiative (BRI) (*The Warsaw Institute Review, 2021*). After the initial success in delivering COVID-19 test kits and protective equipment, China took on the task of developing vaccines. Trials of Chinese vaccines were launched in 18 countries in Asia, Africa and Latin America, making Indonesia a major hub for Chinese clinical trials. Chinese officials also declared the BRI member states to be a top priority for the provision of vaccines, both free and subsidized (*Heydarian, 2021*).

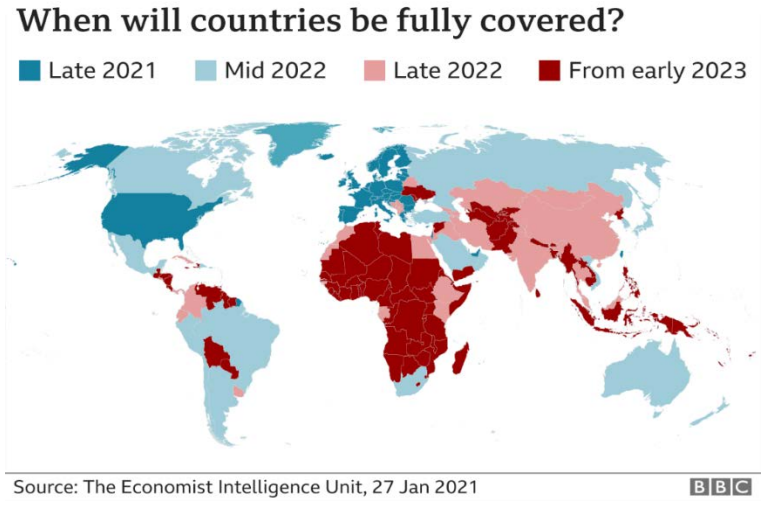

Figure 4: *Vaccine Coverage Projection* (*Hegarty, 2021*)

Figure 5: *Trial of Chinese vaccines in different countries* (*Cohen, 2020*)

Chinese Diplomatic Drive in South and East Asia

According to the latest (14 August 2021) statistics provided by the 'China COVID-19 Vaccine Tracker', China has sold a total of 1.58 billion doses and donated 120 million, among which a total of 1.28 billion doses have been delivered (*Bridge, 2021*). Pakistan, China's all-weather ally, was the first destination of its donation (*Albert, 2021*). In the rest of South Asia, however, China had often clashed with Indian vaccines, as long as India could pacify her neighbourhood with its more reliable Oxford-AstraZeneca jabs. The scenario changed drastically when India backed off her promised vaccine deliveries.

Table 2: *Chinese Vaccine Supply to East and South Asia (Updated on 12 December 2021)* (*Bridge, 2021*)

Country	Name of Vaccines	Number of Vaccines (million)		
		Export	Donation	Total
Afghanistan	Sinopharm	-	0.700	0.700
Bangladesh	Sinopharm, Sinovac	35.895	5.600	41.495
Bhutan	Sinopharm	0.050	-	0.050
Cambodia	Sinopharm, Sinovac	28.500	8.303	36.803
Indonesia	Sinopharm, Sinovac	244.679	1.000	245.679
Lao	Sinopharm	-	7.202	7.202
Maldives	Sinopharm	-	0.218	0.218
Malaysia	Cansino, Sinovac, Sinopharm	8.400	2.500	10.900
Mongolia	Sinopharm	1.200	0.300	1.500
Myanmar	Sinopharm, Sinovac	33.700	8.900	42.600
Nepal	Sinopharm, Sinovac	10.000	3.800	13.800
Pakistan	Sinopharm, Sinovac, Cansino	81.730	3.700	85.430
Philippines	Sinovac	55.000	3.000	58.000
Sri Lanka	Sinopharm	23.000	3.000	26.000
Thailand	Sinopharm, Sinovac	26.500	2.600	29.100
Vietnam	Sinopharm	36.200	1.500	37.700

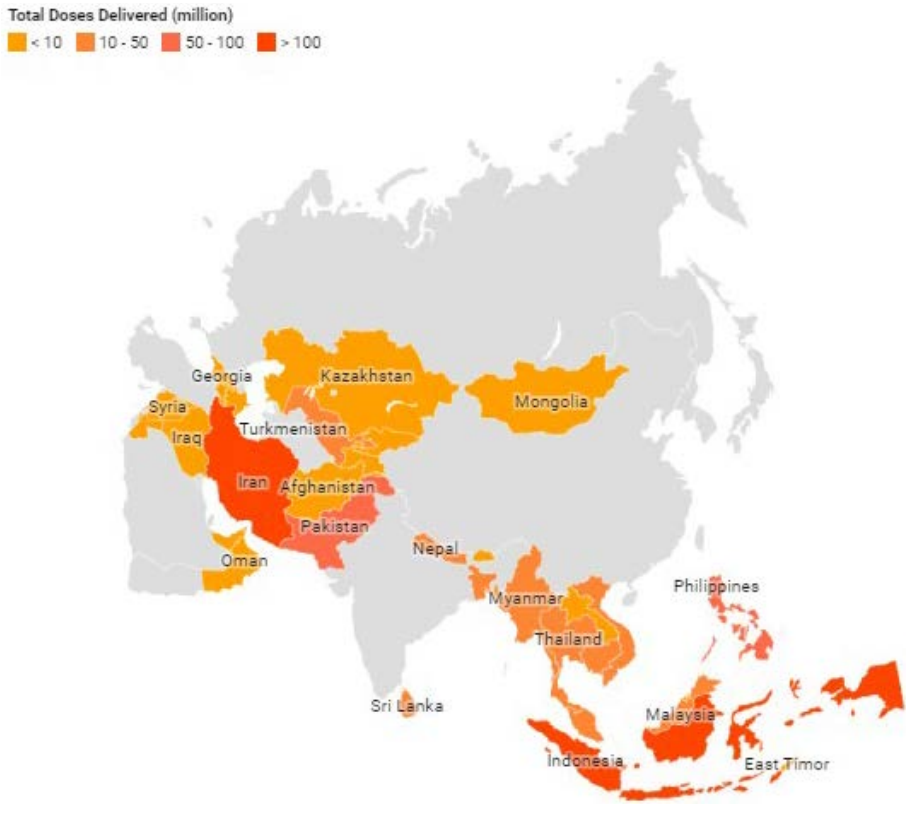

***Figure 6**: Chinese Vaccine Destination in Asia* (*Bridge, 2021*)

China has donated 10 million vaccine doses to developing nations through the COVAX initiative and sent 53.44% (322 million, out of 602.5 million) of its overseas supply to the Asia Pacific region (*Bridge, 2021*). China has also created a 'Storage Platform' named 'Emergency Vaccination Storage Facility for COVID -19 for South Asia' and a cooperation platform named 'China-South Asia Platform for COVID-19 Consultation, Cooperation, and Post-Pandemic Economic Recovery' to face any COVID like disaster. Alongside Bangladesh; Afghanistan, Nepal, Pakistan and Sri Lanka have joined these China-led regional initiatives (*Iqbal & Begum, 2021*). According to Professor Yanzhong Huang, Director of the Center for Global Health Studies at the US-based Seton Hall University, China aims to soften the stand of these countries on territorial and maritime disputes and to cement economic ties to facilitate the BRI. It has come as an opportunity for Beijing not only to project its soft power but also to showcase its technological prowess (*Gilani, 2021*).

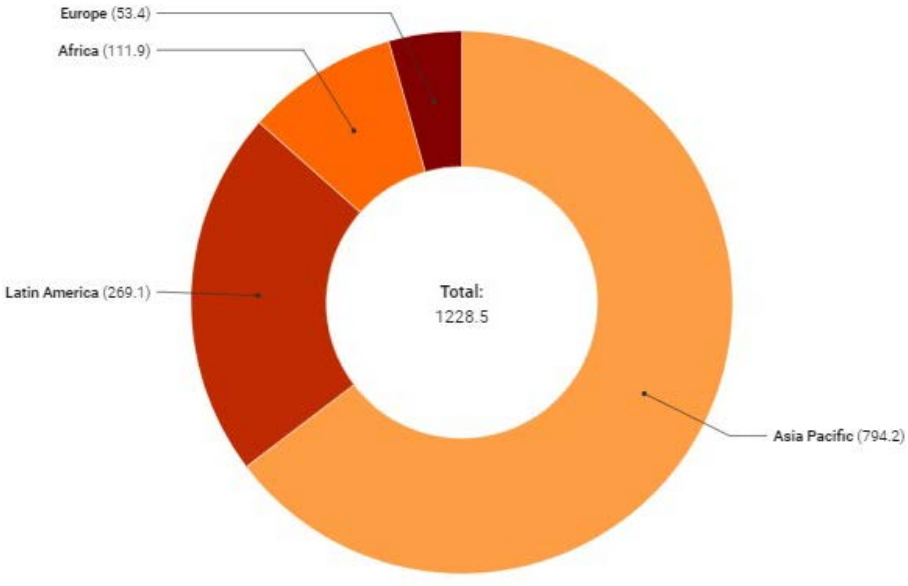

***Figure 7**: Chinese Vaccine Delivery by Geographical Regions (in millions)* (*Bridge, 2021*)

Sino-Indian Diplomatic Duel

The suspension of India's Vaccine Maitri initiative had hindered vaccination programs across much of South Asia and provided China with an opportunity to play again in India's backyard. China first provided Pakistan, India's arch-rival neighbour, then supplied vaccines to Bangladesh, Sri Lanka, and Nepal, first as grants and later commercially; which has a deep strategic subtext. It targets to befriend India's traditional allies in South Asia basing on its 'Five Principles of Peaceful Coexistence' (*Ministry of Foreign Affairs, People's Republic of China, 2014*). China's well-coordinated vaccine diplomacy, coupled with increasing economic engagement with India's neighbours, has provided it with a counterweight to Indian influence in South Asia. India tried to lead the South Asian nations in fighting the pandemic under the umbrella of the South Asian Association for Regional Cooperation (SAARC) and conducted a virtual summit in March 2020. However, China has initiated a separate platform for COVID-19 consultation, cooperation, and post-pandemic economic recovery involving the SAARC countries (*Palma, 2021*). India views China's 'Health Silk Road' as an extension of the BRI encircling India through its neighbourhoods (*Banerji, 2021*). Similarly, China fears India's involvement in the Quad to curb its influence in the Indo-Pacific Ocean and South China seas. The Quad also pledged to respond to COVID-19 and held the first Quad Plus meeting that included representatives from New Zealand, South Korea and Vietnam (*The White House Statement, 2021*).

Skepticisms about Chinese Vaccine Diplomacy

There are skepticisms about the distribution, effectiveness and pricing of Chinese vaccines. International criticisms focused on the lack of transparency over their clinical trial results. Sinovac's efficacy rate varied in trials from 50.4% in Brazil to over 80% in Turkey (*Dou & Mahtani, 2021*), whereas its competitor Russian Sputnik V enjoys above 90% efficacy rate (*Heydarian, 2021*). State-owned Sinopharm has self-reported a 79% efficacy rate, while both vaccines have been criticized for the lack of transparent data about its efficacy and research methods. Chinese vaccines are mostly delivered to friendly developing countries, which enjoy close geopolitical and economic ties with China. Hence, in the future, China's vaccine diplomacy is likely to be challenged by the availability of Western vaccines to these developing nations through COVAX (*The Warsaw Institute Review, 2021*).

RUSSIA'S VACCINE DIPLOMACY

Russia, with a definite agenda for vaccine diplomacy, named its vaccine Sputnik V, commemorating the October 1957 satellite launch that changed global perceptions of Soviet military and space power. Russia also maintains strategic partnerships and cooperation with China in vaccine production and agreed upon locally producing each other's Sputnik and CanSino vaccines respectively. However, the apparent Sino-Russian harmony belies a mutual competition in the Central, East and South Asian vaccine markets (*Wishnick, 2021*).

Sputnik V had been the first COVID-19 vaccine to be registered for use in any nation. Initially, it became controversial since the Russian government authorized its use even before the early-stage trial results were published. Later in February 2021, phase III trial results suggested its 91.6% efficacy at preventing symptomatic COVID-19 infection and 100% efficacy against severe infection. But it is yet to receive approval from the European Medicines Agency (EMA) or the WHO, which is crucial for its widespread distribution to the lower-income nations through the COVAX initiative. Whereas both Sinovac and Sinopharm vaccines have got WHO's approval for emergency use (*Nogrady, 2021*).

Despite the lack of approval, several countries including South Korea and India are already manufacturing Sputnik V (*Stronski, 2021*). It is also gaining increasing acceptance in Europe. Both Germany and France have discussed the joint production of Sputnik V with Russia despite the heightened tensions with Moscow following the imprisonment of opposition leader Alexey Navalny and Russia's recent troop build-up near Ukraine (*Leigh, 2021*). However, Russia is also facing criticisms for failing the timely delivery of promised vaccines due to similar causes as in the case of India (*BBC Monitoring, 2021*).

Both China and Russia deny exploiting diplomatic gains from vaccine exports and donations. Guo Weimin, a Chinese political spokesperson recognized the concept of 'Vaccine Diplomacy' to be "extremely narrow-minded," (*Smith, 2021*) while President Xi Jinping vowed to make it a 'global public good' (*Zhou, 2020*). Similarly, Kremlin spokesperson Dmitry Peskov said, "Russia believes in producing as many doses as possible to reach it among all countries to stop the pandemic." However, experts say that both of their strategy of distributing vaccines is aimed at strengthening diplomatic relationships and expanding their influence (*Smith, 2021*).

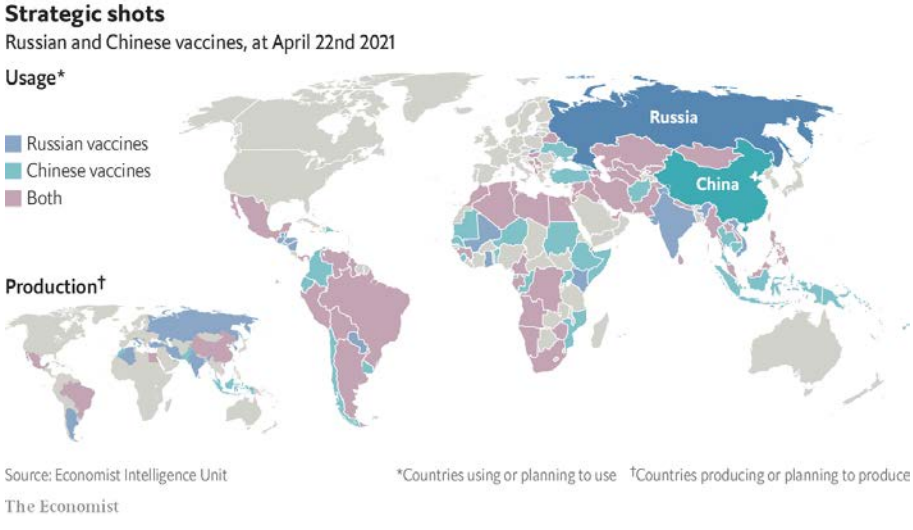

Figure 8: *Recipient of Chinese and Russian Vaccines*
(*Economist Intelligence Unit_B, 2021*)

US ABSENCE AS A GLOBAL LEADER

For China and Russia, the American disarray in the handling of COVID-19 and challenges faced by European countries have provided an opportunity to prove their superiority in response to the pandemic, while distracting from their domestic problems (*Wishnick, 2021*). Thomas Shannon, the former US undersecretary of state for political affairs criticized Trump's decision to step back from the international COVID-19 response which might be instrumental in losing the credibility to other countries (*Smith, 2021*). Many analysts think that the COVID-19 pandemic is a turning point when the US lost its unrivalled monopoly over technology and global leadership. While China is trying its best to fill up the void, it will surely strive to meet its geopolitical interest through soft power diplomacy (*Gilani, 2021*). China's bilateral agreements with many countries to sell and donate her vaccines could provide a commercial foothold

for its pharmaceutical industries in the regions dominated by the US (*Safi, 2021*).

Of late, the Biden administration has reversed its predecessor's 'America First' approach by restoring assistance to the WHO, as well as doubling down on its commitment to support the UN's COVAX scheme, which aims to provide up to 2 billion doses to the poorest nations. With China firmly in sight, the US-led Quad has recently announced a new initiative for joint production of up to 1 billion doses of vaccine in India intended to fulfil the needs of the Southeast Asian nations (*Devraj, et al., 2021*). The US has also declared an initial $2 billion obligation of a total planned $4 billion to GAVI, the Vaccine Alliance to support the COVAX Advance Market Commitment (AMC), making the US the largest donor for equitable global COVID-19 vaccine access (*Anwar, 2021*).

OPPORTUNITY FOR BANGLADESH

Prime Minister Sheikh Hasina drew global attention in the special UNGA session in September 2020 by placing a three-point proposal to encounter the challenges of COVID-19. The proposal included: ensuring universal and equitable access to quality COVID-19 vaccines, transferring technology to developing countries to manufacture vaccines locally, and providing them with financial assistance to face challenges in the wake of the pandemic. Bangladesh repeatedly asserted in the global forums that the COVID vaccine is a global public good and urged the vaccine leaders to help the country produce vaccines locally (*Hossain, 2021*).

State of Vaccination in Bangladesh

According to the latest report (12 December 2021) of Bloomberg Vaccine Tracker, with 2.2% of the world population Bangladesh possesses 1.5% of the world's vaccine supplies. In Bangladesh, the latest vaccination rate is 3,676,028 doses per day, which includes 3,162,278 people getting their first shot. At this pace, by the end of 2021, 75% of the population is likely to receive at least one dose. (*Bloomberg Vaccine Tracker, 2021*).

Acquisition of COVID-19 Vaccines by Bangladesh

Till 12 December 2021, Bangladesh received a total of 25.94562 million doses of vaccines; of which, 11.94562 million are donations and rest 14 million are imported. Detailed distribution of these vaccines are appended in the tables below:

Table 3: Sources of Vaccines for Bangladesh (Updated on 12 December 2021) (Dhaka Tribune_A, 2021; Ministry of External Affairs, India, 2021; Wikipedia, 2021)

Country	Name of Vaccine	Amount of Vaccine (million)			
		Donation	Import	COVAX	Total
China	Sinopharm, Sinovac, Cansino	5.6000	35.8950	-	41.4950
India	AstraZeneca	3.3000	15.0008	3.5000	21.8008
Japan	AstraZeneca	1.6428	-	1.4150	3.0578
US	Moderna, Pfizer	-	-	16.8000	16.8000
Total					83.1536

Bangladesh's Diplomatic Endeavors and Opportunities

In July 2020, Bangladesh Medical Research Council (BMRC) approved Sinovac for Phase III trial at International Centre for Diarrheal Disease Research, Bangladesh (ICDDRB). However, Bangladesh later decided to cancel it when Sinovac asked to co-fund the domestic trials (*Mahboob, 2021*).

Amidst the issues like passing the Indian Citizenship Amendment Act 2019, the deadlock over Teesta river's water sharing and unavailability of expected support for Rohingya repatriation, India's initial support to Bangladesh with the provision of AstraZeneca vaccines was a major diplomatic breakthrough. Bangladesh was the first country to receive vaccines from India's 'Vaccine Maitri' program. On 5 November 2020, a tripartite agreement was signed between the government of Bangladesh, the SII and Beximco Pharma of Bangladesh to procure 30 million doses of AstraZeneca vaccine from SII at $4 per dose (*Molla, 2021*). Bangladesh paid India for 15 million doses in advance (*Tayeb, 2021*), while receiving a total of 10.3 million AstraZeneca vaccines (both as gifts and imports) till February 2021.

Since March 2021, due to the COVID-19 surge in India, it halted its vaccine exports, while Bangladesh was supposed to receive 5 million doses per month as per the contract agreement (*Antara, 2021*). Consequently, since 16 April 2021, Bangladesh had to suspend any new inoculation by AstraZeneca vaccine (*Prothom Alo Desk, 2021*) leaving 1.3 million people in an uncertain situation

about their second dose (*Akram, 2021*). In a desperate attempt, Dr. A. K. Abdul Momen, Foreign Minister of Bangladesh, even called Indian External Affairs Minister S. Jaishankar requesting vaccine doses as gift, as its export was prohibited by India at that time (*Bhuiyan, 2021*). On 22 May 2021, Dr. Momen urged the UK to provide Bangladesh with 1.6 million doses of the AstraZeneca vaccine to complete the second dose of the leftovers (*Chandra, 2021*). Dhaka also requested Washington to immediately send two million doses of the AstraZeneca vaccines from their stock (*Dhaka Tribune_B, 2021*).

India's decision of halting export of vaccines came as a big blow for Bangladesh since the country solely relied on vaccines from SII. It started looking for alternative sources with Russia and China and joined the China-led forum for Covid-19 Consultation, Cooperation, and Post-Pandemic Economic Recovery (*Daily Star Editorial, 2021*). It authorized the emergency use of the Russian Sputnik V vaccine on 27 April (*BSS, Dhaka, 2021*) and approved Russia's proposal to locally produce the vaccine (*Kamruzzaman_A, 2021*).

Meanwhile, in May 2021, Bangladesh signed a non-disclosure agreement with China to procure 15 million doses of Sinopharm vaccines to be delivered 5 million per month from June to August. Bangladesh also proposed to co-produce Sinovac locally (*Tribune Report_A, 2021*). On 12 May, China delivered a gift of 0.5 million doses followed by a warning from Chinese Ambassador Li Jimming that bilateral ties would be damaged if Bangladesh joined the Quad alliance, presumably an anti-Beijing club. Earlier, on 27 April, China's Defence Minister General Wei Feng visited Bangladesh, after two weeks of the visit by Indian Chief of Army Staff (*UNB Dhaka_A, 2021*), and called for enhanced military cooperation to prevent external powers from setting up a 'military alliance in South Asia' (*UNB Dhaka_B, 2021*).

On 27 May, Bangladesh authorized the emergency use of Pfizer–BioNTech COVID-19 vaccine (*bdnews24, 2021*) and on 6 June, Sinovac was also approved (*Tribune Desk_C, 2021*). In May and July, Bangladesh received a total of 5.84562 million doses of Pfizer, Moderna and AstraZeneca vaccines under COVAX initiative (*Tribune Desk_B, 2021*). Reportedly, under COVAX facility, till November 2021 Bangladesh received a total of 16.8 million Pfizer-BioNTech Covid-19 vaccines from US, 1.4150 million AstraZeneka from Japan and 3.5 million AstraZeneka from India (Table-3).

The World Bank has already provided $500 million to Bangladesh to procure vaccines and another $1.5 billion loan to rebuild the post-corona economy. The World Bank also pledged to extend financial support of more than $2.0 billion to 17 countries, including Bangladesh, for the purchase of vaccines (*Iqbal & Begum, 2021*). Meanwhile, an agreement of co-producing the Sinopharm vaccine locally with Incepta Pharmaceuticals Limited is also underway (*UNB Dhaka_C, 2021*). In late November 2021, a local pharmaceutical company Globe Biotech Limited received ethical permission from the Bangladesh Medical Research

Council (BMRC) to begin human trials of Bangavax, a single-dose Covid-19 vaccine (*Tribune Report_E, 2021*).

CONCLUSION

A global population of approximately 7.8 billion (with 84% from the developing and least developed nations) will require around 15 billion doses of COVID-19 vaccines to ensure vaccine coverage for the entire world (*Chowdhury, 2021*). It will likely leave the field of 'Vaccine Diplomacy' open to the vaccine leaders for a prolonged period ahead. The pandemic also ravaged the economies of most of the countries leaving the poor even poorer. Rich countries in the west may find here an opportunity to shore up their leadership image through the conduct of 'Post-pandemic Economic Recovery Diplomacy'. It is worth noting that China has already initiated this diplomacy in South Asia through 'China-South Asia Platform for COVID-19 Consultation, Cooperation, and Post-pandemic Economic Recovery'. By joining this forum along with four other South Asian countries, Bangladesh has demonstrated diplomatic prudence and perceptive decision-making capacity. However, it is important to observe the reactions and possible measures likely to be undertaken by other regional actors in this regard.

The evolving situation is an acid test for Bangladesh's diplomatic skills to assess whether Dhaka is dealing with outstanding pragmatism and a proactive approach in walking on a tightrope between New Delhi, its immediate and most important neighbour, and Beijing, its biggest investment partner and now a major source of vaccines. Meanwhile, India also ramped up its support to Bangladesh by supplying hundreds of tons of liquid medical oxygen (*Tribune Desk_E, 2021*). Bangladesh continues to explore all possible sources for the procurement of COVID-19 vaccines. With its large population size, it is inevitably a lucrative market for vaccine manufacturers both for sale and localized production. Bangladesh has already initiated a Memorandum of Understanding (MoU) for localized production of the Sinopharm vaccine (*Star Digital Report_C, 2021*). Of late, Bangladesh also signed an agreement with Russia to manufacture Sputnik V vaccine in Bangladesh on a co-production arrangement (*Dhaka Tribune_B, 2021*). It will be in the interest of Bangladesh to contact other potential manufacturers of vaccines that might be both feasible and promising in terms of cost, transportation and storage. Strong diplomatic persuasion should be exercised to procure vaccines with the help of Gavi, UNICEF, WHO, Pan American Health Organization (PAHO), CEPI and World Bank etc., while constantly hammering to secure the pledged/promised number of vaccines from different sources. Lastly and most importantly, special emphasis should be placed upon the indigenous development of vaccines which will not only make Bangladesh self-reliant in vaccine production but will also bring down the expenditures of vaccines that are imported currently.

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LAND-ROBOT TECHNOLOGIES, THE INTEGRATION OF COGNITIVE SYSTEMS IN MILITARY AND DEFENSE: A REVIEW

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Abstract: To face the challenges of military defense, modernizing army and their tactical tools is a continuous process. In near future various kinds of missions will be executed by military robots to achieve 100% impact and 0% life risks. Defense robot engineers and companies are interested to automate various strategies for higher efficiency and greater impact as the demand of land defense robots is growing steadily. In this study, land-robots used in military defense system are focused and various types of land-robots are presented focusing on the technical specifications, control strategies, battle engagement, and purpose of use. Recent integration of land-robot technologies in the world military forces, its necessities, and contributions of various international defense companies to the world economy are also presented in this study indicating supremacy in the military automation and economic stability. Limitations and challenges of recent development, robot ethics, and moral impacts are also discussed here with some vital points related to robot security and some suggestions to overcome recent challenges for the future development.

Keywords: *Land-robots; Military robots; Defense robots; Military defense engineering; Ground robots; UGV*

INTRODUCTION

To strengthen military defense system, significant development and increment of intelligent autonomous strategic capacity is necessary. Research on defense technology improvements is the priority in most of the first world countries to modernize the military defense. The characteristics of future warfare can be analyzed based on conflicts in various domains, such as: maritime, land, air, cyber,

space, electromagnetic, and information. Cross-domain (X-domain) and multi-domain strategies are also needed to be focused with the improvement of modern intelligent and robot technologies. Unmanned Autonomous X-domain (multi-domain) Systems, shortly known as UAxS, are now in focus of research and development to make the military force more strong, powerful, and intelligent. Figure 1 presents Multi-domain and X-domain warfare model.

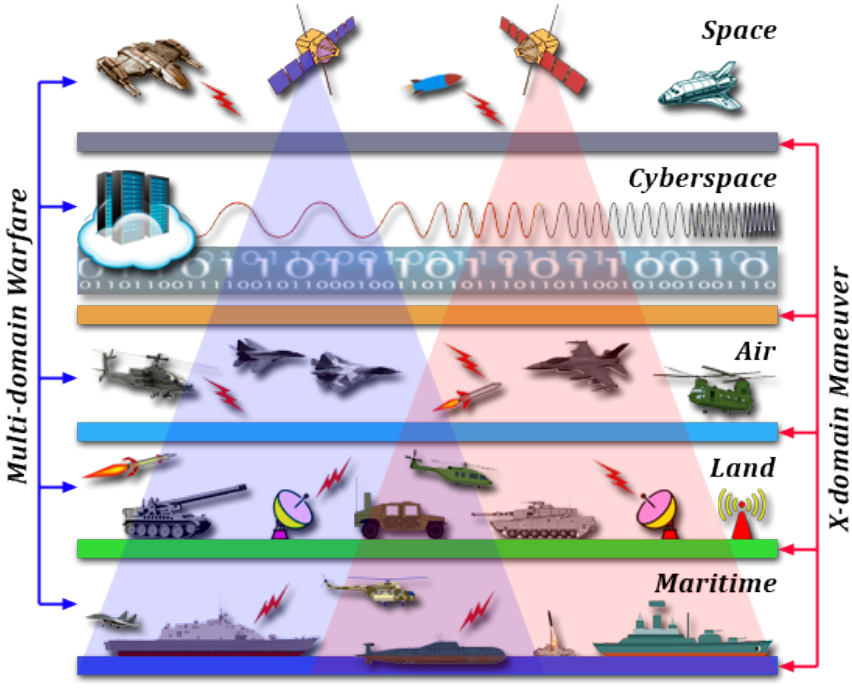

Figure 1: *Multi-domain & X-domain warfare model*

Modern defense mechanism can be studied in four interrelated areas: advance warship, good communication, artificial intelligence, and autonomous weapons. This basically implies the implementation of robot technologies in the military defense system. A well-equipped mechanized force is very important asset to a commander in a battlefield. In a warfare, commander must focus on firepower, mobility, man-machine cooperation, decision making, support armor, and command infantry. In future, robots and automated systems will help on these points by providing supports and reducing burdens, as the systems will be more intelligent, reliable, and cooperative. In the recent military activities, robot and autonomous technologies are used for reconnaissance, equipment supply, surveillance, minesweeping, disaster recovery, injured soldier retrieval, etc. (*Dufourda, & Dalgalarrondo, 2006; Akhtaruzzaman, et al., 2020*).

To ensure reliable use and get the highest impact of the technology, robots must be well designed with semi-automated, automated, and man-machine interaction engineering. Unmanned ground vehicles (UGV) are promising and have great potentials for defense applications where a faster and reliable communication links (link-budget) and Rapid Access to Information (RAtI) are highly required (*Akhtaruzzaman, et al., 2020*). Robots are valued to be worth less than a human life. Robots are faster in sensing, detecting, measuring, and analyzing. Robots does not have any passion or emotion, does not go under fatigue or tired like human, rather remain functioning under extreme and critical conditions. In near future robots will be the core technology for combat planning and engagement (*Abiodun, & Taofeek, 2020*). They will be able to communicate with the environment through smart sensor technologies, understand it through modeling, understand human actions, define threats, follow commands, access to information with grater processing capabilities, interact with other robots through information exchange and sharing, adapt autonomously with hostile environment through advanced control technology, and apply intelligence for self-learning through strong computing capability with auto generated programs (*Akhtaruzzaman, & Shafie, 2010a, 2010b; Karabegović, & Karabegović, 2019*).

UGV systems will be the key technology for military operations in near future as they will ensure almost zero human risks by repositioning no human force directly to the battle. The UGV systems will also be able to open various facilities like load carrying, automatic surveillance, border patrol, risk reducer, obstacle clearance, force multiplier, remote manipulation, signal relay, etc. (*Sathiyanarayanan et al., 2014*). Land defense robots must be adaptable in various rough terrains, ill-environment, and unstructured areas while playing the assigned roles and maintain the command hierarchy. As an extent of military troops, land-robots must not impose any extra workload to the team. Thus, an efficient artificial intelligent (AI) engineering must be imposed for reliable man-machine cooperation between the UGV or land-robots and action troops.

Today's intelligent robots or autonomous weapons are still at the level of Artificial Narrow Intelligence (ANI) (*Horowitz, 2019*) or somehow in between the ANI and Artificial General Intelligence (AGI). Which reflects that they are not yet ready to be fully autonomous and taking reliable decisions in hostile situations like disaster or warfare. Human has intelligence to apply perceptual experiences in a great extent, able to adapt with environment, and can take appropriate decisions in critical situation. If these capacities can be implanted in a robot's brain, the system can be said as AGI system. Though, robots can stand against dull, dirty, and dangerous jobs compared to human, they include some limited functionalities like waypoint or goal-oriented navigation, obstacle detection, obstacle avoidance, threat detection, human detection and identification, localization, map building, information extraction through image and sound processing, and a kind of cooperation with other robots. Thus, a military ground robot would be most efficient if a good collaboration can be ensured between robots and human where a robot will work autonomously under human supervision.

This study presents a review on military land-robot systems, recent technological advancements, applications, and moral impacts. Present situation of some developed and underdeveloped countries, industrial impacts to the world economy through advancing and treading the military arms, automated weapons, and intelligent technologies are reflected in the review study. The paper also delineates the robot ethics in engaging warfare and impacts of the technology in the moral states. The study mainly tries to identify the recent applications and implementations of the ground robot technology through determining the recent gaps, limitations, and ethical impacts of the technological advancements.

ADOPTION OF LAND-ROBOTS IN THE WORLD FORCES AND ECONOMIC ROLE OF MILITARY INDUSTRIES

The typical scenario of linear threat in a battlefield is already replaced with 360-degrees threats (*Baker, 2017*) and it is going to be more dynamic soon with the blessing of modern intelligent technologies (*Talukder, 2016*). To adapt with this situation, a modern army soldier is not only acting in a battlefield as a traditional soldier but also plays important roles as a technocrat, cyber-warrior, and so on. Extremely large military forces, enormous power, automated weapons, unmanned vehicles, intelligent robot technologies, and economic supremacy have made USA the most powerful and uncontested in the globe. They are working continuously to shape the future opportunities and upgrade the power in facing the future challenges through integration of automated robots and intelligent systems. Current military operations in various regions (Pakistan, Yemen, Afghanistan, Iraq, and other) show the application of automated combat strategies (mostly one-sided) of the US soldiers (*Gartzke, 2019*).

One of the strategic competitors to USA is China. In terms of economic growth and modernization of military force, China is treated as the next superpower in the world (*Talukder, 2016*). China has extended its activity in Africa, North America, Asia, and some other parts of the world. Chinese maritime boundary, exclusive air defense strategy, intelligent ground robot soldiers, and UGVs raised tension to many of the recent superpowers. Troops of military robots specially the land-robots are likely to be adopted soon along with the human soldiers in the battel field (*Tang, 2020*).

Russia is not in the sideline of the international conflicts, rather they are renovating and upgrading their defense strengths by introducing new mechanized tanks, aircrafts, missiles, autonomous systems, intelligent robots, and nuclear technologies. During Ukraine crisis and military intervention in Syria reflect the advancement and tactical strength of their military force (*Talukder, 2016*). Russia has demonstrated their own armed ground robot technologies successfully and systematically focusing on AI based advanced military robots and autonomous technologies (*Kozyulin, 2019; Zysk, 2020*).

Iran and North Korea are continuously denying the supremacy of USA and developing their military technologies and demonstrated successful implementation of various types of ground robot soldiers sometimes known as autonomous killer robots. Another nuclear hotspot in South Asia is always rising because of the bitter relation between India and Pakistan. Some countries like Israel, Afghanistan, Iraq, Palestine, Syria, Somalia, and Bosnia are considered as constant warzone in the recent world. Nigerian Military had several loses of its men in the war against Boko Haram terror, that raises the demand of military robots and automated weapon system (*Abiodun, & Taofeek, 2020*). In the rest, most of the countries are relatively in peace. They possess various sizes of military forces and continuously trying to cope with technological advancement on intelligent robots, especially UGV robots, autonomous technologies, and weapons to compete the modern challenges and dynamic threats.

Military industries play important role to contribute to the countries' economy. France is considered to have the strongest and efficient military forces in Europe. According to a statistical study (*Fregan, & Rajnai, 2019*), the total sales of armaments from twenty defense-related companies in several countries are about $263,570.00 million USD. Among these companies, eleven companies are USA based ($172,720.00 million USD), three are UK based ($45,650.00 million USD), three are in Russia ($20,930.00 million USD), two are in France ($13,730.00 million USD), and one is in Italy ($10,540.00 million USD).

Figure 2(a) presents the graphs of armament sales by various countries and Industries as depicted by *Fregan, and Rajnai (2019*). Comparing to the statistics, percentage of arms sales in the years 2015, 2016, and 2018 demonstrated the similar characteristics as illustrated in several studies conducted by *Fleurant et al.* (*2016, 2017, & 2019*). The statistics are demonstrated in Figure 2(b). Though the trend shows that USA reflects comparatively a little less percent (%) in sales comparing to the statistics in 2014, still the country is superior to the other countries having differences as about 6 to about 50 times higher. It is important to note that, the statistics reflect the top 100 arms industries in the world according to the countries in which they have their headquarters. The top 100 do not indicate the total industry of a mentioned country.

Figure 2(c) presents exports and imports of military arms and equipment in five various regions for the duration of ten years, 2007 to 2017 (*Macias & Rattner, 2020*). The highest exports were made by USA about 80.2% while the imports percentage was about 12.2%. Conversely, Asia reflects the opposite scenario with a very low exports (3.5%) and a very high imports (56.1%) of military equipment. Another recent study-report on global share of major arms exports from 2015 to 2019, conducted by *Wezeman et al.* (*2020*), has presented the same characteristics, as shown in Figure 2(d). All the statistical graphs reflect that the production and sales of arms in USA are much higher and beyond reach of other countries where Asia is entirely out of the count.

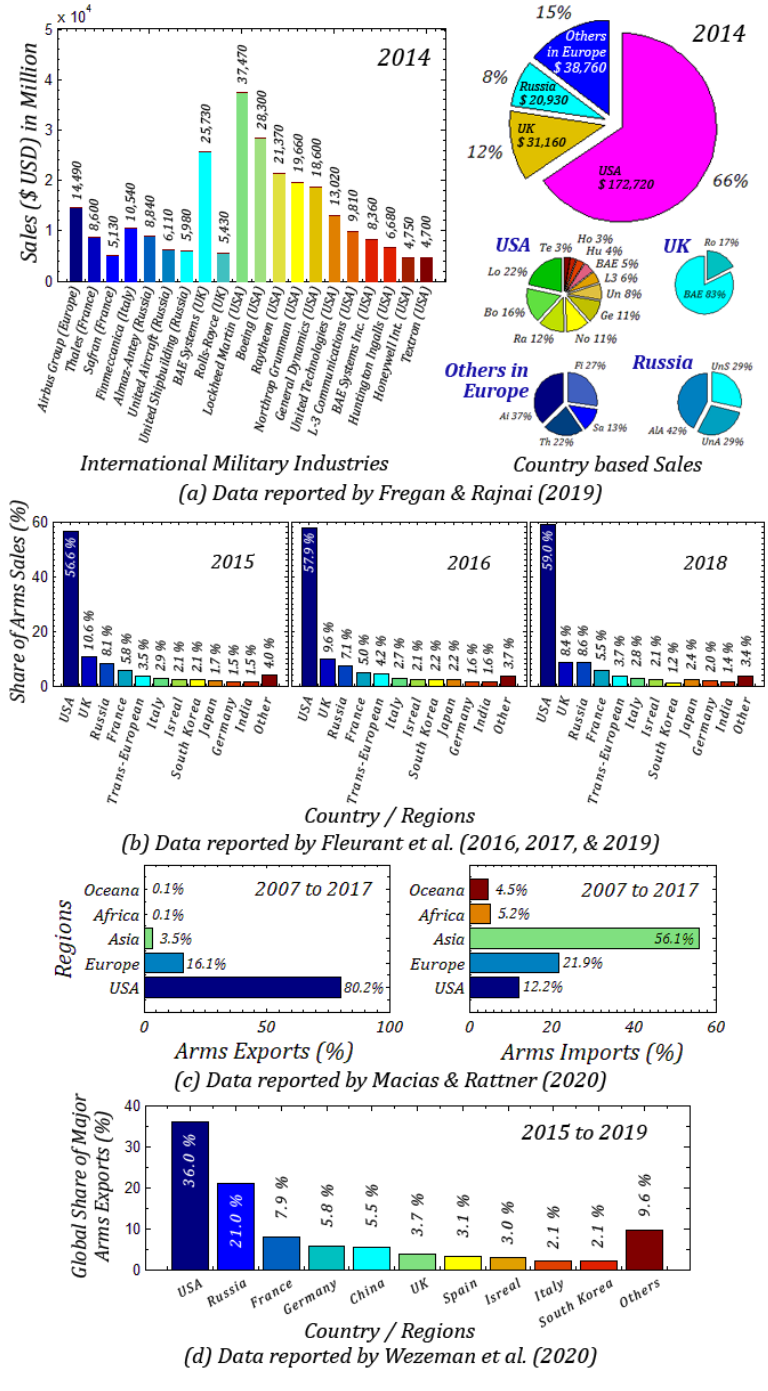

Figure 2: *Military armament sales in various years from various countries and international companies (Fleurant et al., 2016, 2017, & 2019; Fregan, & Rajnai, 2019; Macias & Rattner, 2020; Wezeman et al., 2020)*

TYPES OF LAND-ROBOTS FOR MILITARY USE

Technological advancement has presented new, more complex, dynamic, and intelligent systems that changes the face of war tactic. Usages of drones, UAV, UGV, Unmanned Underwater Vehicle (UUV), Automated Weapon System (AWS) are changing the strategies of force engagement in the warfare. Modern armed forces do not rely on human scouts anymore, rather use small robots which are capable of being invisible to the enemy. UGV robots operates mainly on the ground and perform some specific jobs autonomously or controlled while following command hierarchy. Several research activities are carrying on all over the world to develop various kinds of robots like climbing (wall or tree) robots, robot navigations, bipedal robot locomotion, quadruped robots, snake robots, and so on (*Hossain et al., 2013; Akhtaruzzaman et al., 2009, 2011, 2017*).

Minesweeping Autonomous Vehicle

For mine (both land and sea mines) reconnaissance and area clearance, minesweeping military robots can play important role by ensuring zero live damage. About $(4.45 \times 2.01 \times 1.49)\ m^3$ and $6.8\ ton$ weighted hi-tech URAN-6 robot soldier was deployed by Russia in 2016 for clearing mines in the historic World Heritage site (*Dilipraj, 2016*). During the mission, the robot defused about $3{,}000$ explosives including mines.

A low-cost Robot Aided Mine Sweeper (RAMS) was designed in University of Moratuwa, Sri Lanka with the collaboration of University of Genova, Italy (*Hemapala, & Razzoli, 2012*). The system was inspired by potato digger system and developed based on a tractor unit, and standard agricultural equipment after slight modification. The $\approx 250\ kg$ weight system (about $2.68 \times 0.96 \times 1.25\ m^3$) can be controlled remotely within $300\ m$ of range and can run about $0.72\ km/h$.

For the mine clearing tasks, German army applied UGVs in Afghanistan. The robot was developed under a project "Route Clearing System". There are four robot vehicles under the full system, 1) Command and operating unit, 2) Detection unit, 3) Demining unit, and 4) Transportation unit (*Smolarek, 2019*). The armored transporter (TPz Fuchs KAI) is the main unit for a crew operator to command and direct other UGVs to perform tasks. The commanding UGV unit has a powerful manipulator for demining and can play independent role for reconnaissance. The detection UGV unit (remote-controlled Wiesel/Weasel tracked vehicle, average weight is about $10\ ton$ and size about $3.55 \times 1.82 \times 1.82\ m^3$) is equipped with ground-penetrating radar and metal detector to detect mines, improvised explosives, and unexploded ordnances. The transportation unit has special manipulator where various kinds of sensors and end-effectors can be attached for surveillance and checking hotspots. The demining unit (Mini Mine Wolf, MW-240) can be mounted with various demining equipment like robotic manipulator, tiller unit, flail unit, etc.

Figure 3 shows some minesweeping UGVs used for military activities. Table 1 presents some important specifications of the above-mentioned UGV robots.

Figure 3: *Some autonomous vehicles (UGVs) used for field minesweeping, (a) URAN-6, (b) RAMS, and (c) Rout Clearing System (detection unit) (Hemapala, & Razzoli, 2012; Dilipraj, 2016; Smolarek, 2019)*

Table 1: *Some notable military minesweeping robots (Hemapala, & Razzoli, 2012; Dilipraj, 2016; Smolarek, 2019)*

Robots	Purpose	Speed $(km.h^{-1})$	Size (l, w, h) m	Weight (kg)	Control
URAN-6 (Russia)	Mine clearance	≈ 5.00	4.45, 2.01, 1.49	6.2×10^3	Remotely controlled (1 km)
RAMS (Sri Lanka)	Mine clearance	≈ 0.72	2.68, 0.96, 1.25	2.5×10^2	Remotely controlled (0.3 km)
Route Clearing System (RCS) (German)	Mine detection and clearance	≈ 70.0	3.55, 1.82, 1.82	9.072×10^3	Remotely controlled

Surveillance and Reconnaissance Robots

This type of robots monitors opponent forces or a particular area and transmit videos, pictures, audios, etc. through Global Positioning System (GPS) and Satellite communications. Among various reconnaissance systems, PD-100 (presented in Figure 4(a)) is a small sized personal reconnaissance system that can be ready to engage within a minute. The system is relatively fast, quiet, difficult to catch, has small size flying unit, micro camera, can be controlled (command based or automated) within one kilometer of range, presents itself as a well-equipped spying tool for military use (*Abiodun, & Taofeek, 2020*).

Researchers are working on designing modular snake robot to achieve better mobility on sand hills, trees, land and water, and uneven structures. Such kind of robots basically free modulated hyper-redundant robot, able to move through tight and narrow pathways, can be used for surveillance, reconnaissance, spying, and monitoring purpose. Carnegie Mellon University, USA has presented a serial-

linkage modular Unified Snake robot for surveillance (*Wright et al., 2012*). The robot snake runs on $36V$ $1.5A$ Li-ion battery with $36V$ Brushed DC Motor ($1.3\ Nm$ torque), Analog NTSC video module, 3-axis accelerometer & gyroscope, joint angle sensor, temperature sensor, voltage, and current sensors, and RS-485 Serial link for data transfer. Weight of one module is $0.16\ kg$ ($2.9\ kg$ for 16 modules full robot) and dimensions are $0.051\ m$ in diameter with $0.94\ m$ in length. The robot can move through narrow tunnel, on rough terrain, and can climb tree as shown in Figure 4(b).

A small but smart reconnaissance robot, RABE (Figure 4(c)), is developed by Endeavour Robotics Company, USA and sold to German army in 2018 (*Smolarek, 2019*). The robot UGV is equipped with 4 cameras for $360°$ views from a distance of $0.3\ km$ even in low-light conditions, called as the "Eye of troops". The small sized ($38.1 \times 22.9 \times 10.2\ cm^3$) robot is weighted as $2.5\ kg$ and has demonstrated unbroken (full functional) capability for dropped from $5.0\ m$ height or thrown into a building from a hole or a window. The robot runs on Li-ion battery and can be used continuously for about 6 hours. Table 2 presents some important parameters of the mentioned autonomous robots used for military surveillance and reconnaissance.

Figure 4: *Some examples of autonomous robots for military surveillance and reconnaissance, (a) PD-100, (b) Modular snake robot, and (c) RABE (Wright et al., 2012; Smolarek, 2019; Abiodun, & Taofeek, 2020)*

Table 2: *Notable surveillance and reconnaissance robots for military use (Wright et al., 2012; Smolarek, 2019; Abiodun, & Taofeek, 2020)*

Robots	Purpose	Speed ($km.h^{-1}$)	Size (l, w, h) m	Weight (kg)	Control
PD-100 (Norway)	Surveillance & Reconnaissance	≈ 21.0	0.10, 0.025	0.16	Remotely controlled (1.6 km)
Unified Snake Robot (USA)	Surveillance & Reconnaissance	Relatively slow	0.051 (dia.) 0.94 (length)	2.9	Remotely controlled
RABE (USA/Germany)	Surveillance & Reconnaissance	≈ 05.5	0.38, 0.23, 0.10	2.5	Remotely controlled (0.3 km)

Load Carrying and Transportation Robots

This kind of robot can replace soldier in transporting artillery, bomb, military supplies, heavy equipment, other materials, or even soldiers if necessary. Autonomous Platform Demonstrator (APD) is a military UGV robot used by US army for autonomous navigation and transportation. Hybrid-electric drive, advanced suspension, six drive wheels, and lightweight chassis have made the UGV super cool for military use (*Army Guide, 2020a*). The vehicle (weight about $9.0\ ton$) can run at speed up to $80 - 50\ km$ per hour (*RDECOM, 2010*). Figure 5(a) presents some UGVs for military logistic support.

To transport logistical units, Big Dog robot (Figure 5(b)) was developed for US army by Boston Dynamics. The hydraulic powered four-legged robot is able to move (walk) on any kind of rough terrain (Rocky, Icy, muddy, sloppy ($\approx 35°$), or even slippery terrains) where a conventional vehicle cannot travel on. The robot is able to carry 150 kg of additional load, follow command from a distance, and can travel $4\ to\ 6.4\ km.h^{-1}$ (*Dilipraj, 2016*).

Another Big Dog like four-legged robotic mule LS3 (Cujo or Alpha Dog) was presented in 2012 by the same company, shown in Figure 5(c). The robot can carry $180\ kg$ of load for $32\ km$ without refueling. One of the main drawbacks of these types of robots is the loud noise (*Sapaty, 2015; Hua, 2020*). The $362.9\ kg$ weight robot ($2.00 \times 0.90 \times 1.90\ m^3$) is autonomous, remotely controlled, and able to reach about $11.1\ km/h$ as maximum speed.

RS2-H1 Small Multipurpose Equipment Transport (SMET) is another UGV robot (pack-bot) used in US military forces for load carrying and logistic support, as shown in Figure 5(d). The Howe and Howe technology's SMET robot has demonstrated about $97\ km$ march (average speed $2.0\ km.h^{-1}$) through rough and tough terrains (jungle) while carrying about $454\ kg$ of load, clearly reflecting a great usability and support for army. The system is a mid-sized electric drive energy efficient hybrid autonomous vehicle capable of producing high torque while moving. Report says that the company is going to manufacture thousands of units of the UGV in the recent year for US army (*Layton, 2018; DefPost, 2020*). SMET could be configured for reconnaissance or autonomous weapon system (*CRS Report, 2018*). Table 3 presents basic specifications of the described robots.

Figure 5: *Example UGVs for military logistic support, (a) APD, (b) Big Dog, (c) LS3 Cujo, and (d) RS2-H1 SMET (Army Guide, 2020a; DefPost, 2020; Hua, 2020)*

Table 3: *Technical specifications of some notable robots for Logistic Support (Dilipraj, 2016; Layton, 2018; DefPost, 2020; RDECOM, 2010; Army Guide, 2020a)*

Robots	Purpose	Speed ($km.h^{-1}$)	Size (l, w, h) m	Weight (kg)	Control
APD (USA)	Navigation and Transportation	80 *to* 50	4.62, 2.49, 2.21	8.2×10^3	Automatic & Remotely controlled
BIG DOG (USA)	Logistics Support	≈ 06.4	1.10, 0.30, 1.00	108	Automated & Remotely controlled
LS3 (Cujo) (USA)	Logistics Support	≈ 11.1	2.00, 0.90, 1.90	3.63×10^2	Automated & Remotely controlled
RS2-H1 SMET (USA)	Load carrying and logistic support	≈ 02.0	mid-sized electric drive UGV	Unknown	Automated & Remotely controlled

Search and Rescue Robots

A robot army can participate in search and rescue mission in desert, wild area, forest, flooded area, wreckages, tsunami, chernobyl, or even under water. Robots can move freely in biological, radiological, or chemical environment and search, track, and rescue which is totally impossible for a human rescuer. In a rescue mission, majority of casualties occurred because of the delay in providing necessary aid to the victims. Rescue robots can be used to minimize the delay time to save maximum number of lives.

Extremely light weight (Mini-VIPeR $3.5\ kg$ and Maxi-VIPeR $11.4\ kg$) and easily portable UGV called Versatile-Intelligent-Portable-Robot (VIPeR) was introduced in Israel (*Dilipraj, 2016*). The advanced sensory systems have made the robot intelligent enough for automated surveying before engaging any actions. The robot is claimed to be highly suitable for field analysis and supporting land warriors. The advantages of the robot are, it can be mounted with Galileo Wheel, attached with small arms, and used for surveillance and reconnaissance (*Army Guide, 2020b*).

One of the most advanced bipedal (humanoid) robot is Atlas from Defense Advanced Research Projects Agency (DARPA) and Boston Dynamics. Custom made motors, valves, and most compact mobile hydraulic system enable the bipedal robot to produce high power to each joint of the 28-DoF (Degree of Freedom) system. Advance balance control mechanism enables the anthropoid to become more agile almost like a human. The $1.5\ m$ tall Bipedal Intelligent Machine (BIM) weighted about $80\ kg$ and runs at the speed of $5.4\ km.h^{-1}$. The robot can move on any kind of rough terrain, can crawl, jump, hop, forward flip, backflip, jump-turn, jump-roll, climbing stairs, traverse a door, and so on. The

robot is designed as a rescue robot but the future of this type of robot will be more dramatic and ominous (*Banerjee et al., 2015; Antal, 2016*).

In the early 21st century, Wolverine V2, the post disaster rescue robot was deployed by Mine Health and Safety Administration (MHSA), USA (*Reddy, 2015*), shown in Figure 6(c). The remotely controlled robot was basically designed for military use as a rescue (specially mine rescue) and bomb squad robot which is equipped with three cameras, and gas sensor with continuous sampling capability. The robot is controlled through a fiber-optic cable from about $1.5\ km$ away and able to feed live video data to the control unit. The $1.27 \times 0.76\ m^2$ robot was weighted as $550\ kg$. The main drawback of the robot was its heavy weight and long cable attachment.

Figure 6 shows the above-mentioned rescue robots for military uses. Some important specifications are presented in Table 4.

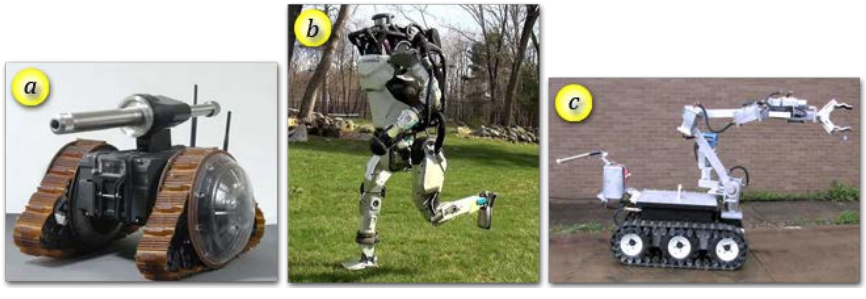

Figure 6: *Some military robots used in search and rescue missions, (a) Maxi-VIPeR, (b) Atlas, and (c) Wolverine V2 (Banerjee et al., 2015; Reddy, 2015; Antal, 2016; Dilipraj, 2016)*

Table 4: *Basic specifications of some remarkable Search and Rescue Robots used in Military (Banerjee et al., 2015; Reddy, 2015; Antal, 2016; Dilipraj, 2016)*

Robots	Purpose	Speed ($km.h^{-1}$)	Size (l, w, h) m	Weight (kg)	Control
Maxi-VIPeR (Israel)	Automated surveying	Unknown	$0.46, 0.46, 0.23$	≈ 11.4	Remotely controlled with a helmet-mounted display
Atlas (USA)	Search and rescue	≈ 5.4 (Running)	$1.5\ m$ tall	≈ 80.0	Automated and remotely controlled
Wolverine V2 (USA)	Mine rescue and Bomb squad	Unknown	$1.27, 0.76$	≈ 550.0	Through fiber-optic cable ($1.5\ km$)

Bomb Disposal and Chemical Detection Robots

To identify and disarm explosive devices and dangerous objects, Explosive Ordnance Disposal (EOD) robots are used. Some well-known potential EOD robots are TALON, iRobot 510 PackBot, tEODor, and Dragon Runner.

Electric powered remotely controlled root DAKSH (DRDO DAKSH, India) is designed for recovering Improvised Explosive Devices (IEDs), localizing dangerous objects, bombs, suspicious packages, and destruct or defuse these dangerous objects (*Dilipraj, 2016*). The rubber wheel (6-wheels) based robot can be operated within half of a kilometer away and the system is equipped with camera, control equipment, reconnaissance system, robotic arm, X-ray device, water-jet, and large-caliber shotgun. The robot can blast closed door, climbs stairs, over steep hills, maneuver in tight spaces, and more. DAKSH can run for 3 hours and handle $20kg$ from $2.5\ m$ and $9\ kg$ from $4\ m$ extension of arm.

The telerob Explosive Ordnance Disposal and observation robot, shortly known as tEODor, is successfully used by German soldiers in Afghanistan (*Smolarek, 2019*). The robot weights $360\ kg$, runs at $3\ km.h^{-1}$, and can be operated remotely from the range of $0.2\ km$. The robot was designed for EOD, identification, and removal of IEDs. The robot can work continuously for four hours (20 hours for only camera functioning mode) and can handle $20\ kg$ to $100\ kg$ for the operating distance at $1.81\ m$ to $0.4\ m$.

In late 2015, the PackBot 510 (shown in Figure 7(c)) was deployed by US army in the Camp Stanley, Republic of Korea for chemical detection. The robot was specially designed with Chemical Biological Radiological Nuclear and Explosives (CBRNE) detection capabilities. The robot also can be used as a bomb disposal, monitoring, surveillance, and reconnaissance system (*Antal, 2016*).

Example of some bomb disposal military UGVs are presented in Figure 7. Some important parameters are presented in Table 5.

Figure 7: *Example of some military robots used for Bomb disposal and Chemical detection, (a) DAKSH, (b) tEODor, and (c) PackBot 510 (Antal, 2016; Dilipraj, 2016; Smolarek, 2019)*

Table 5: *Some important specifications of the above-mentioned EOD robots for military use (Antal, 2016; Dilipraj, 2016; Smolarek, 2019)*

Robots	Purpose	Speed $(km.h^{-1})$	Size (l, w, h) m	Weight (kg)	Control
DAKSH (India)	Recover IEDs and Bomb disposal	Faster (Unknown)	Unknown	Lighter (Unknown)	Remotely operated (0.5 km)
tEOD (Germany)	Observation and EOD	≈ 3.0	$1.37, 0.69, 1.13$	≈ 360.0	Remotely operated (0.2 km)
PackBot (USA)	Bomb disposal, monitoring and surveillance	≈ 9.3	$0.69, 0.52, 0.18$	≈ 14.3	Remotely operated (1.0 km)

Firefighting Robots

Military firefighting robot is a kind of unmanned autonomous vehicle equipped with a hydrant or other equipment to extinguish fire. This kind of robot can save lives by minimizing the risks of a human firefighter (*AlHaza et al., 2015*). The common and useful sensors used by a firefighting robot are visual camera, gas sensor, Infrared (IR) camera, flame detection sensors, temperature sensor, extinguishers, multi-directional nozzle, etc. A fire-fighting robot must be capable of working in high temperature ($700°$ or more) environment (*AlHaza et al., 2015*). Recently some gigantic automated controlled firefighter robots are in under research and development.

The Shipboard Autonomous Firefighting Robot (SAFFiR) was the first firefighting humanoid (bipedal) robot deployed by US Navy (*Nuță et al., 2015*). The humanoid can detect and extinguish fire autonomously. It is also able to work cooperatively with human firefighters and has the heat tolerance level up to $500°C$. Advance navigation and balance control technology have made the robot capable to navigate on board and search for survivors while by maintaining its upright position during pitching and rolling sea condition. The 33 DoF waterproof bipedal fire-fighting robot is $1.78\ meter$ in height and equipped with camera, gas sensor, temperature sensor, IR, Ultra Violate (UV) sensor, heavy duty gripper, and more. The robot can be engaged to any fire-fighting situation and able to support for about 30 minutes continuously (*Kim, & Lattimer, 2015; Nuță et al., 2015; Liu, 2016*).

A remotely controlled (wireless $260\ m$) double tracked fire-fighting robot from A2Z Smart Technologies Corp., Israel, is named as Fire Fighting and Rescue (FFR-1) robot (*Tan et al., 2013*). The fire-fighter robot can be deployed to handle hazardous situations like high temperature, chemical fumes, and risky buildings. The $940\ kg$ weighted (length $1.62\ m$, width $1.14\ m$, and height $1.38\ m$) robot runs on $24\ V$ battery powered two electric motors and able to reach at the speed

of about 3 to 4 $km.h^{-1}$. The robot can carry 3 $inch$ fire hose, able to climb 30° inclined terrain, and can handle water flow up to 4.2×10^3 $liters.\min^{-1}$ at 15 $bars$. The robot has its internal cooling system (double-walled) to control internal temperature because of high external heat. A multi-functional surveillance camera, one front-road camera, and one spot-light unit have made the robot user friendly during operation.

Robotic firefighting must ensure certain tasks like locating, detecting, and analyzing fires; assisting search and rescue operations; monitoring hazardous variables; and most importantly the fire control and suppression. To support these jobs, a small tank-sized autonomous vehicle, Thermite robot, is designed for US army (*Nuță et al., 2015*). The remotely operated (form a distance of 0.4 km) robot can pump 2.3×10^3 $liters$ of water per minutes. Small size ($l = 0.188\ m; w = 0.088\ m; h = 0.139\ m$) and light weight of the robot increase its ability to pass through a door, surf indoor environment, and easy to carry (two robots) by specially designed Bulldog Fire-fighting Truck (*Nuță et al., 2015*). Its internal cooling system uses some of the pumped water, as a coolant, through its body. The robot has a high-resolution camera and can be used as a multipurpose system like surveillance robot, bulldozer, bomb disposal and improvised explosives neutralizer through robotic arm.

Some other fire-fighting robots are Colossus from Shark Robotics, France; TC800-FF from Tecdron, France; Parosha Cheatah GOSAFER from Netherland, Multiscope Rescue from Milrem Robotics, Estonia, UK; URAN-14 from Russia, Turbine Aided Firefighting Machine (TAF 20) from Emi Controls, Bolzano, Italy; and so on.

Figure 8 shows some notable fire-fighting robots. Basic technical parameters of the described UGVs are provided in Table 6.

Figure 8: *Fire-fighting UGVs, (a) SAFFiR, (b) FFR-1, (c) Thermite, and (d) TAF-20 (Tan et al., 2013; AlHaza et al., 2015; Kim, & Lattimer, 2015; Nuță et al., 2015; Liu, 2016; AirCore TAF35, 2020)*

Table 6: *Some fire-fighting robots for military support (Tan et al., 2013; AlHaza et al., 2015; Kim, & Lattimer, 2015; Nuţă et al., 2015; Liu, 2016; AirCore TAF35, 2020)*

Robots	Purpose	Speed ($km.h^{-1}$)	Size (l, w, h) m	Weight (kg)	Control
SAFFiR (USA)	Fire-fighting humanoid	Slow	1.78 (height)	≈ 63.50	Autonomous with supervision
FFR-1 (Israel)	Fire-fighting UGV	≈ 4.00	1.62, 1.14, 1.38	≈ 940	Remotely controlled
Thermite RS1 (USA)	Combat fires	≈ 9.66	0.19, 0.09, 0.14	$\approx 7.26 \times 10^2$	Remotely operated ($\approx 0.4\ km$)
TAF-20 (Italy)	Fire-fighting UGV	≈ 9.00	2.91, 1.62, 2.15	$\approx 3.9 \times 10^3$	Remotely controlled ($0.3\ km$)

Armed Military Robots

Some military robots are equipped with heavy artillery, bomb, weapons, and guns; directly engaged in a warfare and attacks the target enemy while ensuring zero threats to the troops. Combat support military robots can be applied for anti-submarine operation, fire support, laying mines, battle damage management, electronic warfare, strike mission, etc. Russia has developed and implemented several combat robots, like Platform-M, WOLF-2, and Shooter. The WOLF-2 (MPK-002-BG-57 VOLK-2) was deployed as strategic missile forces to protect Topol-M and Yasr missiles. The robot is equipped with Kalashnikov, large-caliber Utes, and Kord machine guns, high-tech camera, a laser range finder, gyrostabilizer, and protected by special armor. It can run $35.41\ km.h^{-1}$ at the same time able to shoot with precision in any weather condition and can be controlled remotely within $3\ km$ in range (*Dilipraj, 2016*).

For automated mission support, Tracked Hybrid Modular Infantry System (THeMIS) UGV was unveiled by MilRem Robotics supported by Estonian Ministry of Defence. The $2.1\ m$ length ($850\ kg$ weight) robot can run at $50\ km.h^{-1}$ speed and can carry $750\ kg$ of payload (*Army Technology, 2020*). The main purpose of the robot is to support military missions in dangerous and hazardous area where it is hard-to-reach by the human military force. The UGV is able to provide multipurpose supports, such as surveillance, reconnaissance, logistic support, target acquisition, rescue, firefighting, communication relay, emergency evacuation, troops transportation, and so on. The on-board video tracking mechanism (through day-night imaging system) and Laser range finder ensure the UGV to engage on stationary as well as moving targets. On demand, the UGV can be equipped with heavy machine-guns, grenade launcher, and air-bursting munition system.

The Ripsaw M5 Robotic Combat Vehicle (Ripsaw M5 RCV) is an extreme and most grievous mid-size off-road super-tank designed for US army operations.

The remote controlled UGV is equipped with $360°$ visual camera, thermal imaging system, gimballed surveillance system, real-time situation/environmental awareness system, terrain engagement mechanism, and a medium-caliber cannon ($30\ mm$ next-generation Chain Gun cannon or Mk44 Bushmaster II cannon). Other sophisticated and hi-tec mechanisms like SkyRaider drone, mine clearing mechanism, defeat rollers, and CROWS Javelin missile have made the RCV more deadly and dangerous to the target. The RCV weighted as $\approx 3.9 \times 10^3\ kg$, has $600\ hp$ Duramax diesel engine, and can run at a top speed of about $96.6\ km.h^{-1}$ (*Mizokami, 2019*).

Figure 9 shows some remarkable armed UGVs used in Military combat. Some important technical specifications are presented in Table 7.

Figure 9: *Armed UGVs, (a)* WOLF-2*, (b)* THeMIS*, and (c)* Ripsaw M5 RCV *(Dilipraj, 2016; Mizokami, 2019; Army Technology, 2020)*

Table 7: *Some notable military UGV armed robots with some technical specifications (Dilipraj, 2016; Mizokami, 2019; Army Technology, 2020)*

Robots	Purpose	Speed ($km.h^{-1}$)	Size (l, w, h) m	Weight (kg)	Control
WOLF-2 (Russia)	Guard and protection	≈ 35.41	Small size tank	0.9×10^3	Remotely controlled ($3\ km$)
THeMIS (UK)	Mission support (multipurpose)	≈ 50.00	$2.10, 2.10, 0.98$	850	Automated & Remotely controlled
Ripsaw M5 RCV (USA)	Combat Vehicle	≈ 96.6	Mid-sized Tank	3.9×10^3	Automated & Remotely controlled

Automated Weapon System (AWS)

Autonomous weapon technology is considered as the third revolution in warfare after gunpowder and nuclear arms. This technology can be seen in all military domains, marine, land, air, and space. The recent well-known baneful AWS systems are Aegis Combat System (ACS), Phalanx CIWS, X-47B UCAS, Patriot,

MANTIS, IAI Harop (IAI Harpy) air defense systems, and so on (*Abaimov, & Martellini, 2020*).

An old but powerful automated weapon system, Goalkeeper, was developed by Netherlands in 1979. The system was able to track enemy missiles, aircraft, surface vehicles, or any high-speed threats and destroy with the capability of 4200 shots per minute (*Abiodun, & Taofeek, 2020*). Its dual locator system (two radar sub-systems) can identify the locations and attacks the highest priority threats instantaneously through its GAU-8/A 30 mm Gatling gun, the high precision seven-barrel cannon. The active system automatically embarks on the complete air defense activity such as observation, sensing, targeting, destroy, and selection of the next high precedence target. The system can handle 18 targets at a time. The land-based automatic system is known as Centurion C-RAM (Counter-Rocket, Artillery, and Mortar weapon) system.

Advanced Test High Energy Asset (ATHENA) is a Military Anti-UAV lethal weapon system which is the upgraded version of Area Defense Anti-Munitions (ADAM) system (*Yaacoub et al., 2020*). It has 30-KW Accelerated Laser Demonstration Initiative (ALADIN) laser which is a collective single beam power of three 10-KW fiber lasers. The system is developed by Aerospace and defense company named Lockheed Martin Corporation in USA to defeat low-value threats like UAVs, improvised rockets, baleful vehicles, UGVs, and small boats. ATHENA is a ground-based transportable laser weapon system for military use. Operation range of the system is several kilometers where the laser travels at light speed and produce intense light and heat on a small spot that bedazzles, damages irreparably, or destroys the target (*Kaushal & Kaddoum, 2017*).

To protect the forward-operating bases of the German Army in Afghanistan, NBS MANTIS (NBS C-RAM) was developed by Rheinmetall AG in Germany (2007-2011). The weapon is a very short-range $35\ mm$ fully automated air defense system based on the Skyshield gun of the designer company (*ICRC, 2014*). The AWS is also used to protect military installations from artillery, rocket, and mortar attacks. The full system consists of three units, shooting unit, sensor unit, and a central command ground-control unit. The shooting unit consists of six $35\ mm$ automatic guns; the sensor unit has two sub-units equipped with radar, effectors, and electro-optical sensors. The lethal fully automated system is active all the time (24 hours – 7 days) and responses within 4.5 seconds to detect and shoot the target (*ICRC, 2014; Amoroso et al., 2018*).

Autonomous weapons may not be considered as robots and they are not even UGVs. But the systems are intelligent enough to detect, track, shoot, and destroy any threat autonomously, thus reflecting one step ahead of Artificial Narrow Intelligence (ANI). Examples of some autonomous weapon systems are shown in Figure 10. Key specifications of some remarkable autonomous weapon systems used in military are presented in Table 8.

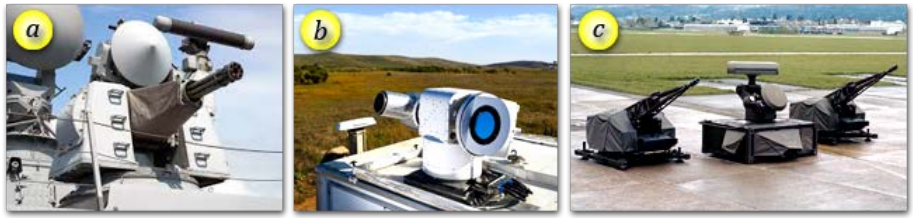

Figure 10: *Automated weapon systems for military use, (a)* Goalkeeper, *(b)* ATHENA, *and (c)* NBS MANTIS *(ICRC, 2014; Kaushal & Kaddoum, 2017; Amoroso et al., 2018; Abiodun, & Taofeek, 2020; Yaacoub et al., 2020)*

Table 8: *Some key specifications of noteworthy autonomous weapon system used for military combat (ICRC, 2014; Kaushal & Kaddoum, 2017; Amoroso et al., 2018; Abiodun, & Taofeek, 2020; Yaacoub et al., 2020)*

Autonomous weapons	Purpose	GUN Type	Response time	Firing range	Setup
Goalkeeper/ Phalanx/C-RAM (Netherlands)	Track high-speed threats and destroy	GAU-8/A 30 mm Gatling gun	5.5 seconds & 4200 shots/min.	Effective range 1.5 *to* 2.0 *km*	Defense system for battel ship and Land-based transportable weapon system
ATHENA (USA)	Defeat improvised vehicles	30-KW ALADIN laser	Laser travels at light speed	Several kilometers (> 1.6 *km*)	Ground-based transportable laser weapon system
NBS MANTIS (Germany)	Air defense system, active for 24/7	Short-range 35*mm* fully automated	4.5 seconds to detect and shoot & 1000 rounds/min.	Missiles detection 3*km* and engage firing	Ground-based (fixed) shooting unit, sensor unit, and command unit

LIMITATIONS AND CHALLENGES OF RECENT DEVELOPMENT

Though a great advancement on military ground robot technologies is observed nowadays, none of the systems are fully autonomous or independent task solver. It is very important for a military robot to take minimum control commands and behave more likely to be loyal independent system. Most of the recent systems are comparatively complex in control which engage soldiers to operate the system. Minimum manpower and minimum engagement are very much required in a battlefield. Moreover, cooperative robots (robot-robot cooperation and human-robot interaction) are in a great demand to run a robot troops with basic control commands to ensure zero damage to human lives. Collaborative Robotic

Cyber-Physical System (CRCPS) is one of the most interesting concepts which could be adopted in designing military collaborative robots.

Robots are mainly mechatronics (sometimes bio-mechatronics) systems which requires electric power to run, mostly battery powered. Other than the battery cells, power generators are loud and noisy, thus breaks the theme of the silence operations. Notably, most of the actuators of land-robots are noisy while moving or in action. Furthermore, providing services for long time requires more power backup and quick recharging capabilities, which are still not so easy and most of the cases are impossible in a battlefield.

Robots could be threatened by other robots or robot-worms. The term 'robot-worm' is new which indicates some tiny or little sized flexible or as usual robotic systems which can block some sensitive parts or sensors of a robot physically undetected and produces fake signals to confuse the robotic system in making its decisions. As the shield of this threat, anti-worm technology needs to be thought and designed. Another issue that blocks communication channel is signal jammer. Sometimes signal jammer may cut off the communication from the base control, thus autonomous intelligent robots are required.

Recently, there are several issues raised against service robots that caused harms to workers, infants, and general people (*Shyvakov, 2017; Bhardwaj, Avasthi, & Goundar, 2019*). These enlighten some big questions about the uses of autonomous military lethal robots. Results could be more devastating if a robot is hacked or tempered. Robot safety and security are the vital concern prior to provide any type of service. Robot security is complicated than a computer security as robot has some unique capabilities such as object manipulation, interaction to the environment, cognition through cameras and auditory sensors, complex and freedom motions, access to the internet, uses of cellular or satellite network, etc. A robotic system is equipped with sensors, actuators, drivers, controllers, thus vulnerable to several problems such as intrusion or hardware failure. Nowadays, robots run on a complete operating system which raise the issue of virus attack, DoS/DDoS attack, or hacking, same as computer operating system (*Breiling, Dieber, & Schartner, 2017*). Third-party control systems of robots' modules may open intrusion windows leads to unauthorized access to the system. Internal and external cyber-attack also need to be considered in designing an intelligent and knowledge based CRCPS (*Khalid et al., 2018*). The following issues could be pointed out because of which a robot can be in vulnerable attack.

- Opensource framework and libraries
- Insecure network and communication
- Missing authentication
- Weak configuration
- Weak cryptography

- Weak filtering of command
- Weak authentication procedure
- Command injection
- Memory or data corruption
- Flaws in mechatronics system design
- Physical damage
- Insecure or compromised control center
- Weak anti-virus or anti-worm technology
- Uses of untrusted third-party control modules
- Unstructured and weak security framework

The major limitations of recent technological developments can be identified as follows.

- Strong rules and regulations are absent in terms of development, applications, and uses or control of the modern intelligent technologies.
- Constructive and combined support for research and development of the technology are still not satisfactory, mostly absent.
- Security framework is not strong enough and even not well defined.
- Reliable, efficient, and continuous power support are imperative for an intelligent UGV robot which are still not in acceptable and desired level.
- The actuating mechanisms of available systems are still not in its reliable state in terms of size, power consumptions, noise, durability, and generated torque or force.
- Reliable, high-capacity, and compound sensory mechanisms are required for an intelligent system which are rarely found in the recent development.
- Secured, reliable, long-range, and fast communication are still under research and development.
- Higher memory and swift processing capacity will provide power to an intelligent autonomous robot for huge storage, faster data retrieval, quick analysis of environment, and accurate decision making. This capacity is still not reflected in the recent systems.
- The recent developments are limited to some specific terrains or environment. An expert system for universal terrain is still absent.

- To investigate and determine the possible causes and explanations of failure or any vulnerability of robotic system is time consuming and most of the cases very difficult.
- Autonomous in a sense of independent decision making and controlled action with environmental constraints are not observed in any of the recent systems.
- Mission sensitive materials in a sense of smart materials which actualize its environment and response accordingly are rarely used in designing the skeleton of the intelligent UGV robots.
- Anti-worm strategies have not yet been incorporated, not even thought to be integrated in designing a well-equipped intelligent ground robot for military use.
- UAxS are still absent in the military application.

Table 9 presents some characteristics of the above-mentioned military robots and autonomous weapons in terms of research stage, usability, combat support, service, easy transform capability, field application, and expected outcomes.

Table 9: *Characteristics and recent status of some military land-robots*

Types	Robots	Initial stage	Usable	Lethal	Service robot	Can modify	Applied	Expected results
Minesweeping	URAN-6	×	√	×	√	×	√	√
	RAMS	√	×	×	√	×	×	×
	RCS	×	√	×	√	√	√	√
Surveillance	PD-100	×	√	×	√	×	√	√
	Snake	√	√	×	√	×	×	×
	RABE	×	√	⊙	√	√	√	√
Logistic support	APD	×	√	⊙	√	√	√	√
	BIG DOG	√	√	⊙	√	√	×	×
	LS3 (Cujo)	√	√	⊙	√	√	×	×
	RS2-H1 SMET	×	√	⊙	√	√	√	√

$\surd \rightarrow Yes$; $\times \rightarrow No$; $\odot \rightarrow Sometimes$;

Table 9: (Continued.)

Types	Robots	Initial stage	Usable	Lethal	Service robot	Can modify	Applied	Expected results
Search & rescue	VIPeR	×	√	⊙	√	√	√	√
	Atlas	√	×	×	√	√	×	×
	Wolverine V2	√	√	⊙	√	√	√	×
EOD robots	DAKSH	×	√	⊙	√	√	√	√
	tEOD	×	√	⊙	√	√	√	√
	PackBot	×	√	⊙	√	√	√	√
Firefighting	SAFFiR	√	×	×	√	×	×	×
	FFR-1	×	√	×	√	√	√	√
	Thermite RS1	×	√	×	√	√	√	√
	TAF-20	×	√	×	√	√	√	√
Armed robots	WOLF-2	×	√	√	√	√	√	√
	THeMIS	×	√	√	√	√	√	√
	Ripsaw M5 RCV	×	√	√	√	√	√	√
Autonomous weapons	Goalkeeper	×	√	√	×	×	√	√
	ATHENA	×	√	√	×	×	√	√
	NBS MANTIS	×	√	√	×	×	√	√

$\surd \rightarrow Yes$; $\times \rightarrow No$; $\odot \rightarrow Sometimes$;

ROBOT ETHICS AND MORAL IMPACTS

Technological advancements have brought us in the age of AI where machine artifacts are displaying their smartness and mightiness in most of the cases. It is not the responsibility of scientists to eliminate or reduce human inhumanity through technological integration. It is impossible. Thus, if it flushes up during a warfare, it raises a big question to the humanity. Military training is to build a soldier more like a robot, which will never be achieved. On the other hand, the

more a machine advances towards Artificial Super Intelligence (ASI), the more it tries to achieve humanity, and that will always be nothing but a dream.

There may always be counterarguments to the use of robotic armies. It is very difficult, sometimes contradictory, to blame if something goes wrong with a robot. Usages of autonomous robots may lower the tolerance level of entering a warfare. The meaning of unilateral engagement to a warfare could reflect some different meaning far beyond just a warfare. Misleading or disobeying an order could raise threats to the commander and the troops. Distinguishing valid and invalid targets is also under the consideration of robot ethics. As the modern weapons are autonomous, moral programming is imperative (*Umbrello, Torres, & De Bellis, 2020*).

Justifying political issues may mislead an intelligent robot. Winning support of the public and civilian will be impossible if a robot is allowed and permitted to destroy or kill. Technology transfer could raise another big question if the system comes on the hand of terrorist groups. Moreover, advance AI robots may enforce to realize human as threat to robots' existence, the reflection could be a nightmare to humanity.

Literally, laws can be considered as the moral actors in deciding life and death without human intervention. Robots must be bounded by the defined and specific state laws and moral rules same as for human. A robot must not be allowed in a battlefield if it does not pass some predefined tests. Asimov's three laws of robotics are perfect. If any intelligent machine does not obey these three rules, must not be defined as robots, rather be defined as Monster Robot (Monster-bot or Mobot), the ultimate threat to humanity. A combat robot must possess some specific sensors or equipment to collect combatant data for further analysis and comparisons. This implies the uses of Black Box equipped with a robot system as the Command and Action Recorder (CAR). Sooner or later robots will be more active in battlefields. Whatever the nature of a military robot is (manual, semi-automated, or automated), they must be supervised and human controlled. Otherwise, there will be no halter and "Robotanity" (opposite of Humanity to the robots ASI) will walk one step ahead than the benevolence and humankind will be under threat.

RECOMMENDATIONS

Following recommendations can be made for the future development and improvement of the intelligent land-robot technology.

- First, it is obvious to define state laws and moral ethics to control the development, applications, distributions, and access to the technology and system. If the technological development is not monitored, if the control goes to wrong hand, or distributed to some unauthorized

community, the impact will be devastating, and human existence will be under unbearable and undeniable threat.

- States, institutions, and industries should come forward and work together to provide legitimate support, research support, and economic security to conduct any development process smooth and uninterrupted. Technological research facilities should be created in state level as well as institutional and industrial level.
- A well-structured security framework should be engineered for the future design and development of the autonomous weapons and robot technologies.
- Stable, efficient, and longtime power support are very much required to get continuous support from a UGV robot. Thus, requires a high-class research and development activities on the power support system. Some efficient techniques are needed to be discovered for efficient and faster (or ultra-fast) charging of the power storage devices.
- Efficient electro-mechanical actuators are required with zero noise level to ensure any defense operation undetected by the opponent. This will involve a high-quality research on electro-mechanical engineering.
- Efficient sensor technologies will provide wide opportunity to the intelligent robots to sense, recognize, understand, and adapt in any kind of environment. This points to the world class research on sensor technology.
- Reliable, long range, faster, and continuous communication is one of the important requirements for military land-robot and autonomous technologies. Efficient devices for communication are required to ensure a secured and reliable transfer of data. This basically opens another wide field of research and development opportunity.
- High quality faster processing capability is another requirement for a military land-robot. Efficient image and data processing capability will increase the efficiency of the intelligent autonomous system.
- Moving on all kinds of terrains (uneven, bumpy, slippery, rocky, icy, and so on) and obstacle avoidance are one of the challenges in the field of defense land-robotic research. Efficient multi DoF, multi legged, multi wheeled, or transformable mechanism with modern and advanced control engineering application could solve the problem.
- Any kind of failure of a robotic platform must be analyzed and investigated which is found absent in most of the development programs. To adapt this facility, a kind of Black Box system can be implemented for command and action recording.

- Military robots must be designed with autonomous capability for navigation, decision making, and action to its environment. For any communication cut off or signal jamming, the robot must take its own decision to survive and return to the base.
- Military robot skeleton and body frame must be designed with optimum structural concept (armored, light, heavy, flexible, transformable, transparent, invisibility, or color shifting). Thus, smart materials are required which opens another potential field of research and development.
- Robots must be design with anti-worm defense mechanism. A defense robot may carry several tiny robots (robot-worms or swarm-robots) which could be applied to attack opponents and create illusions.
- Intelligent autonomous robots could be developed and tested with the focus of universal support for x-domain (cross domain) applications. This mainly accumulates several engineering approaches like maritime engineering, aerospace engineering, cyberspace engineering, communication engineering, and robotics.

CONCLUSION

Eventually, military robot forces will be applied more effectively in near future to carryout investigations, surveillance, reconnaissance, petrol operation, gather information, spy location, breach enemy security, and provide supports in a battlefield. It is obvious that the next modern warfare will be based on autonomous weapon and intelligent defense systems. Some statistics say that the US army are renovating and applying the UGV robots and autonomous weapon systems which are about 60% of the total army (*Sapaty, 2015*). By the year 2025, US army will be well equipped with more UGVs, and robots than human soldiers (*Antal, 2018*). China is entering into the Golden Age of AI development and going to be the next leader as they receive a huge support from the highest level of Chinese policies and leadership. Russia have seen the future as, whoever become the leader in the field of AI will be the ruler of the future world. Future warfare will engage soldiers in operation and control of intelligent machines rather than direct shooting to each other. Bipedal Intelligent Machine (BIM) will be the next level of AGI and will continue to reach beyond the ASI soldiers in a future battlefield. The concept of Cloud Robotics and Internet of Things (IoT) based Cloud Computing will make the Intelligent Machine (IM) more powerful (*Ahmed et al., 2020*) in terms of data processing, information storage, information sharing, information analysis, RAtI, decision making, automated combat planning, and even thinking. All of these will be the blessings of technological advancement like super-computer, faster processor, super-fast communication, and huge data storage capability. In a word, cloud will hold the brain of a future

IM and the machine on the ground will be responsible to provide feedback and execute commands. Whatever the situation will be in the future, it is mandatory to establish a good and reliable man-machine cooperation mechanism for the automated machines by setting the rules and obeying the ethics of war, otherwise humanity will be in irrecoverable danger.

This study basically tried to present a variety of land-robot technologies used in various military activities. Challenges in recent technologies, robot security issues, robot ethics, and moral impacts are also discussed in this study. Future study could focus on a particular type of land-robot to analyze recent development challenges, gaps, impacts, and future potentials. Robot security and robot ethics are other two domains which could be focused extensively to design a structured framework in using such intelligent robot technologies in military combat and warfare. Of course, human will be benefited by the integrated intelligent technology only if the misuse of the technology can be controlled through strong command and control with fine morality and ethics.

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BOOK REVIEW: PERMANENT RECORD BY EDWARD JOSEPH SNOWDEN

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Abstract: Book review of 'Permanent Record' by Edward Joseph Snowden, Metropolitan Books, Henry Holt and Company, 2019, 352 pages, ISBN-10: 1250237238, hardcover 14.99 USD, Kindle 11.99 USD.

Keywords: *Permanent Record; Edward Joseph Snowden; Metropolitan Books; Henry Holt and Company*

An excitingly readable biography, exposing online surveillance by US intelligence agencies, Permanent Record became a bestseller after the US Attorney General intervened with circulation. The writer, Edward Snowden's treasure trove of NSA and CIA experience is available on YouTube since 2013. The cinematic account of his life's tale appeared previously as the 2016 Oliver Stone's movie Snowden and literary records include articles of the Guardian newspaper, Luke Harding's book The Snowden Files (2014) and Anatoly Kucherena's book Time of the Octopus (2015).

Harry Truman reported to have said, "The only thing new in this world is the history you don't know." Thus, this three-part book with twenty-nine sections is certainly different and a fabulous read. Part one comprising ten sections describes his naïve early years, fascination with computers, suffering from mononucleosis disease, short military stint and falling in love. Part two, from section eleven to eighteen, describes the inner functional and technological activities of the NSA and CIA mass surveillance drive, his daily errands in mainland USA, Geneva and Hawaii, and his rapid career progression. The part also refers to how such encroaching into privacy was executed beyond constitutional guidelines, popular knowledge and government accountability. The third part of the book tells about his conscience against the mutation of the intelligence community as the fourth state, how he gravitated towards defection, publicizing the evil surveillance enterprise, surviving arrest and exile. Towards the end, Snowden added some unique wrinkles by adding diaries of his wife Lindsay.

A whistleblower, who is considered by many as a traitor and by many as a modern-day hero, Edward Snowden asserted his position in the preface stating "I used to work for the government; now I work for the people." The preface itself is an interesting and revealing read. While he acknowledged the need for intelligence collection, the key argument in the entire book is the preservation of the value of privacy as citizens' basic constitutional right. Snowden writes, "The freedom of a country can only be measured by its respect for the rights of its citizens, and it's my conviction that these rights are in fact limitations of state power that define exactly where and when a government may not infringe into that domain of personal or individual freedoms that during the American Revolution was called "liberty" and during the Internet Revolution is called "privacy." As the principal character of the book and a former NSA-CIA employee, he warns common internet and phone users about how every moment of their life is under surveillance by NSA-CIA developed programs like STELLERWIND, XKEYSCORE, PRISM etc. Snowden created subtle thrills and sensations by layers of events fused with experience and technical processes. Inclusions of photos, maps and diagrams could have enriched the content value but possibly are avoided to dodge future legal ramifications.

He tried to develop awareness about the violation of the constitutional rights of US citizens and the violation of the rights of every human on the planet according to the universal declaration of human rights. Recognizing the need for national security and intelligence for the state, the writer through lucid description tried to convince the citizens, as target audience, about the unchecked violation of privacy and civil liberty by the so-called fourth state. Though many of the issues and events of the book were known and predictable because of the movie and books on Snowden, the storyline remains interesting and has new and stimulating substances. Specially, the third part describes the thrill and suspense of collecting evidence, escape, and exile. Like Victor Ostrovsky's book By Way of Deception: The Making of a Mossad Officer, which was a revelation against Mossad assassination missions, Snowden was against the cyber and surveillance measures of NSA-CIA rogue operations and the failure of the US government to end those irregularities.

After reading the book, US citizens and citizens of other countries will get a clear idea about unlawful US surveillance into the private affairs of innocent individuals. Subtly, Snowden suggested using Tor Browser to maintain privacy and avert surveillance. Besides, he discouraged the use of android or iPhones and encouraged the use of primitive button phone.

Permanent Record is predictable in its content and is recommended for leisure reading. Because, as a mid-level employee, Snowden had limited access and negligible influence in NSA or CIA decision-making cycle. The possible moral, institutional and financial discourses at the Federal Government level are naturally absent. Thus, this book will be of limited help for those who wish to unearth the ethical dilemma and cause leading to a lack of accountability.

Snowden's personal and professional motivation for his maiden book was driven by consciousness. As a newcomer to the literary world, he did satisfactory work and has created a welcome addition to the field of autobiography and surveillance.

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