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EDITORIAL BOARD

EDITORIAL

The Editorial Board is pleased to present the 79th Issue of *Bangladesh Army Journal* to its valued readers. This esteemed publication continues to function as a vital professional platform where officers of Bangladesh Army express their ideas, exchange scholarly insights and contribute to strengthen the intellectual fabric of the military community. The Journal remains committed to fostering an open and constructive forum for discussion on significant matters appertaining to Bangladesh Army as well as contemporary important issues.

The Journal encompasses a wide spectrum of themes, including national and regional security dynamics, global strategic developments, military training and education, leadership and command philosophies, the historical evolution of warfare, emerging technologies, civil-military relations and best practices at the unit level. Each issue seeks to uphold relevance and depth in addressing future challenges.

This edition features a diverse and engaging collection of articles that explore key modern military concerns. Topics include security issues of Bangladesh due to Forcibly Displaced Myanmar Nationals, cyber power, second career of retired officers, battlefield stress, integrating Generation Z into military culture, decision making through Artificial Intelligence, innovation in training, command and control of conventional and unconventional warfare, hologram technology in Bangladesh Army et cetera. Collectively, these contributions demonstrate the intellectual rigour and strategic insight of the authors, offering meaningful perspectives for military professionals, academics and policy makers.

The Editorial Board expresses its deep gratitude to **General Waker-Uz-Zaman, SBP, OSP, SGP, psc, Chief of Army Staff, Bangladesh Army** and Chief Patron of *Bangladesh Army Journal* for his visionary leadership and steadfast support towards publishing a world-class publication. We also extend sincere appreciations to the **Chief of General Staff,** for his valuable guidance, thoughtful suggestions and continued encouragement which has significantly contributed to maintaining the Journal's excellence.

We acknowledge the authors whose well-researched, analytical and thought-provoking works have enriched this issue. Our appreciation also goes to all individuals who have contributed directly or indirectly to the timely publication of the 79th Issue. While every effort has been made to ensure accuracy and quality, any inadvertent errors or omissions are sincerely regretted. The Editorial Board remains dedicated to the continual improvement of *Bangladesh Army Journal* and welcomes constructive feedback to guide its future endeavours.

BANGLADESH ARMY JOURNAL

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Forcibly Displaced Myanmar Nationals: A Rising National Security Concern for Bangladesh and Ways Forward

Brigadier General Md Humayun Kabir, SUP (BAR), SPP, ndc, psc, MPhil

Abstract

The Forcibly Displaced Myanmar Nationals (FDMN) crisis, triggered by Myanmar's 2017 military crackdown in Rakhine State, has transformed Bangladesh's south-eastern region into the world's largest refugee enclave. As of early 2026, over 1.3 million FDMN, including newly arrived populations, remain stateless and heavily reliant on humanitarian assistance. Prolonged displacement has intensified socio-economic pressures, strained public services and contributed to inter-group tensions. Emerging security threats include organized crime, drug trafficking, human trafficking, militant activity and environmental degradation. These challenges pose significant implications for national security, economic stability and regional relations. This article examines the historical roots of the FDMN crisis, evaluates the current living conditions and analyzes evolving internal security threats using a mixed-method research approach, including surveys, key informant interviews and secondary literature. The study highlights the need for a multi-pronged strategy combining safe and voluntary repatriation, robust refugee management, strengthened law enforcement, environmental interventions, economic inclusion and regional cooperation. Balancing humanitarian responsibility with strategic security planning is essential to mitigate risks while upholding Bangladesh's international obligations. Effective implementation of these measures will support the FDMN population sustainably and preserve Bangladesh's national security and socio-economic stability.

Keywords*: National Security, FDMN, Humanitarian Crisis, Repatriation, Organized Crime, Border Management, Socio-Economic Impact.*

Introduction

The FDMN, officially designated as Forcibly Displaced Myanmar Nationals, residing in Bangladesh, have gradually become a significant factor shaping the country's social, economic and demographic landscape. Since the large-scale influx in 2017, their prolonged stay has created layered consequences that extend beyond humanitarian management. In the camps and surrounding host communities, particularly in the south-eastern region, local security dynamics have evolved in complex ways. Reports of organized crime, drug trafficking, human trafficking, armed group activity and inter-group violence have increased in FDMN-concentrated areas. At the same time, mounting pressure on land, livelihoods, public services and local infrastructure has intensified tensions between host communities and refugees. Security analysts caution that if these trends are not addressed with foresight and coordination, they may impose substantial political, economic and security costs not only on Bangladesh but also on the wider region. While Bangladesh's humanitarian commitment

remains commendable, unmanaged vulnerabilities could evolve into broader national security and reputational risks. Antonio Guterres, United Nations Secretary General, the ninth Secretary-General of the United Nations, serving since January 1, 2017 very appositely remarks, "The FDMN are one of the most discriminated against and vulnerable communities on Earth. The FDMN crisis is a humanitarian and human rights nightmare. I thank Bangladesh for its generosity in hosting the refugees."[1]

This article critically examines the security implications arising from the 2017 FDMN influx. It traces the historical and structural drivers of displacement, evaluates the present condition of the refugee population and assesses emerging internal security challenges within Bangladesh. The study is guided by the central question: What security threats are emerging from the FDMN presence in Bangladesh? Associated inquiries explore the root causes of migration, the evolving security situation in the south-eastern sector and feasible mitigation strategies.

Operating on the hypothesis that the FDMN influx presents significant security challenges to the south-eastern region with potential nationwide implications, the research adopts a mixed-method approach. Data were gathered through content analysis, surveys, key informant interviews, focused group discussions and secondary literature, involving 193 respondents, including FDMN participants, subject-matter experts and practitioners. This approach ensures a balanced, evidence-based assessment and supports practical, policy-oriented recommendations.

Who are the FDMNs?

The FDMN are a Muslim ethnic minority originating from Myanmar's Rakhine State. They have their own language, cultural traditions and religious identity that distinguish them from other communities in the country. Historical records and local accounts indicate that they have lived in the region for generations. Yet, despite this long-standing presence, successive governments in Myanmar have refused to recognize them as one of the country's official ethnic groups. The 1982 Citizenship Law effectively rendered most FDMN stateless, stripping them of citizenship and denying access to education, healthcare, freedom of movement and political participation. They were frequently labeled as "foreigners" or "Bengalees." This narrative was used to question their belonging and justify exclusion. Over the decades, the FDMN faced recurring waves of discrimination, forced displacement and communal violence. Tensions escalated sharply in 2017 when Myanmar's military launched a sweeping crackdown in Rakhine State. Widespread reports of killings, sexual violence, arson and village destruction drew strong international condemnation. Facing systematic persecution and fearing for their lives, hundreds of thousands of FDMN crossed into Bangladesh in search of safety. They arrived with little more than what they could carry, seeking refuge and basic protection from continued violence and uncertainty.

Historical Roots of the Crisis

The FDMN issue did not emerge suddenly in 2017. It is rooted in a long and complicated history shaped by colonial administration, post-independence politics and evolving regional power dynamics. During British rule, migration within the province of Bengal and Arakan altered local demographies and later became a point of political contention. Debates over national identity intensified after Myanmar gained independence in 1948. The new state gradually narrowed the definition of who belonged and the FDMN found themselves pushed outside that definition. With the passage of time, citizenship laws, administrative restrictions and discriminatory policies institutionalized their exclusion.

In the decades that followed, FDMN communities were subjected to movement restrictions, land confiscation and limited access to education and employment. Military operations in 1978 and again in the early 1990s triggered earlier waves of displacement into Bangladesh. Each episode deepened mistrust and reinforced the perception of the FDMN as an unwanted population. Later, the 1982 Citizenship Law formalized their statelessness, as pointed above. Nationalist rhetoric further hardened attitudes. Influential political and religious actors portrayed the FDMN as demographic and security threats. They framed the FDMN's presence as a challenge to Myanmar's sovereignty and cultural identity. Strategic interests among elites, including the consolidation of domestic political support and control over Rakhine's strategic coastline, reinforced this narrative. Over time, discrimination evolved into systematic persecution. By 2017, conditions had deteriorated to such an extent that mass violence and displacement were not isolated incidents but the culmination of decades of exclusion, marginalization and deliberate political framing.

Table 1: Statistics of FDMN

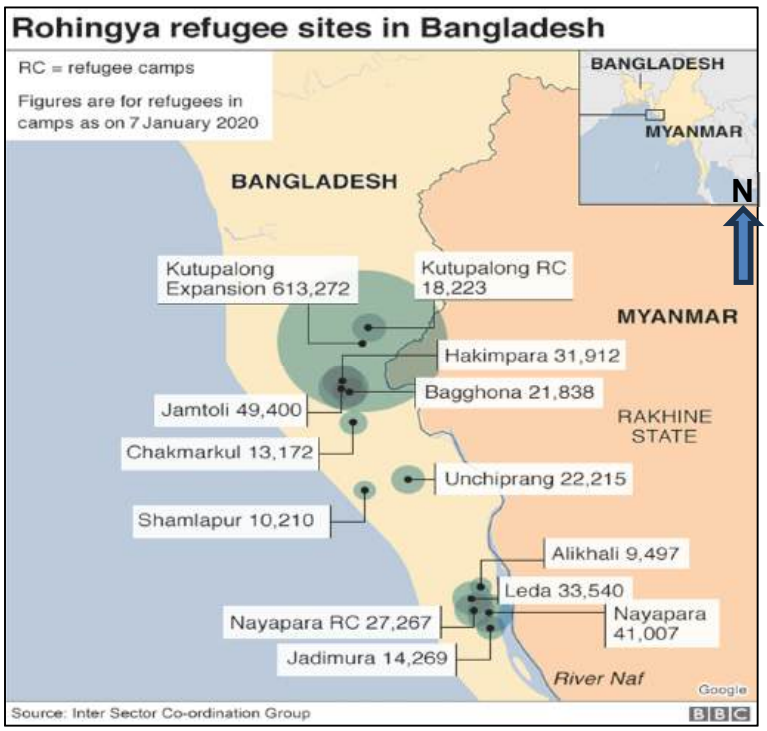
Serial	Questions	Answers
1.	Total number of FDMNs in Bangladesh as of now	Registered: 11,68,398 (includes all previously registered) Newly registered: 1,36,518 (arrived between December 2024 and October 2025) Total: 13,04,916
2.	Total number of FDMN who came to Bangladesh in 2017 (recorded number)	8,29,036 FDMN
3.	Number of FDMN who had been living in Bangladesh before 2017	2,30,000 (approximately) (Out of them, only 37,782 were registered)
4.	Since 2017, the number of new born baby added to the FDMN population	Total 1,49,580 (approximately)
5.	After 2017, the number of FDMN who joined from Myanmar	A total of 2,30,000 (approximately) FDMN joined from Myanmar after 2017

Source: Camp Commanders

Present State of FDMN in Bangladesh

Population and Camp Infrastructure: As of early 2026, Bangladesh hosts an estimated 1.2 million FDMN in Cox's Bazar and Bhasan Char.[2] Some data sources note even higher totals, over 1.3 million, when including unregistered cases and additional new arrivals from ongoing conflict zones. The camps, especially Kutupalong-Balukhali settlements, remain among the most densely populated refugee enclaves in the world. Infrastructure struggles to keep pace with needs, with water, sanitation and hygiene (WASH) facilities increasingly overstretched amid population growth and shrinking aid budgets.

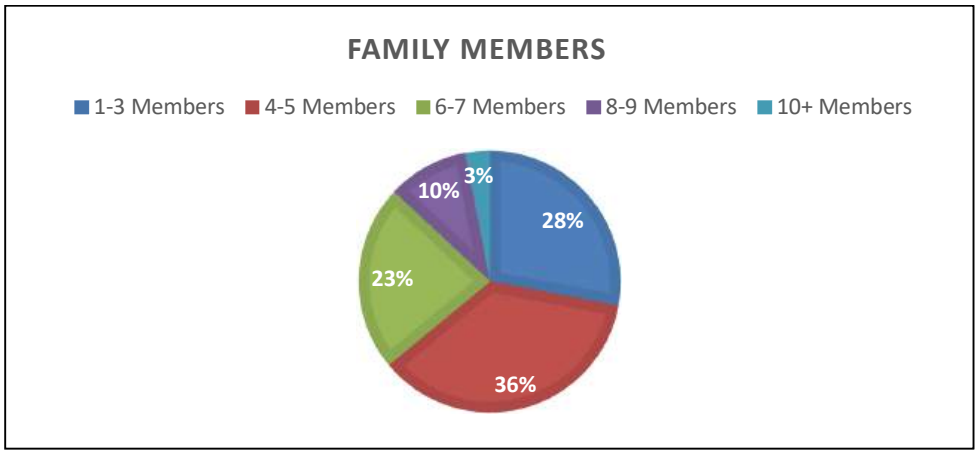
Figure-1: FDMN Sites in Bangladesh



Source: Inter sector co-ordination group, BBC

Living Conditions and Basic Needs: Most FDMN families live in densely packed shelters made of bamboo frames and tarpaulin sheets. Such structures offer minimal protection against heavy rain, strong winds and seasonal cyclones. Space is limited, privacy is scarce and basic infrastructure remains fragile. Electricity is mainly supplied through small solar units. Water and sanitation services depend heavily on NGOs and humanitarian agencies' support. In recent years, reductions in food assistance due to declining donor contributions have increased food insecurity. It left many families struggling to meet daily nutritional needs.

Figure-2: Distribution of Family Members



Source: Author's self-construct

Healthcare and Education: Healthcare services inside the camps remain basic and overstretched. Primary health posts and field hospitals provide essential treatment, maternal care and vaccination services. Yet, shortages of trained personnel, medicines and equipment are common. Emergency referrals are complicated by congestion and limited transport. Education services operate largely through informal learning centres that follow structured but non-formal curricula. These initiatives are meant to prevent a lost generation, but access is still uneven, especially for adolescents. Opportunities for higher or recognized education remain very limited.

Livelihoods and Restrictions: FDMN are not legally authorized to engage in formal employment in Bangladesh. This significantly limits their ability to become self-reliant. As a result, many rely entirely on humanitarian assistance or turn to informal, low-paid and often irregular work within or outside the camps. Movement restrictions further constrain economic participation and skill development. These limitations reflect the government's policy stance on temporary shelter but also highlight the tension between humanitarian responsibility and concerns over long-term integration and national security.

Dependence on Humanitarian Assistance: Humanitarian operations in Cox's Bazar and surrounding areas are coordinated under the Joint Response Plan, covering both refugees and vulnerable host communities. Current estimates suggest that around 1.48 million people require some form of assistance, including food, shelter, healthcare, protection and disaster preparedness support. The 2025-26 appeal sought nearly 934.5 million USD to sustain essential services and strengthen resilience. However, persistent funding gaps threaten programme continuity, raising concerns about reduced rations, limited protection services and weakened emergency response capacity.[3]

Emerging Internal Security Threats

While humanitarian imperatives remain central, the prolonged refugee presence has intersected with evolving security concerns. These threats can be grouped under key categories affecting Bangladesh's internal and regional stability, as outlined below:-

Common Criminal Offences: Prolonged displacement, limited livelihood options and restrictions on formal employment have created conditions where minor crime, theft, extortion and small-scale violence are becoming more visible within and around the camps. While the majority of FDMN remain law-abiding, frustration among unemployed youth and the presence of informal power structures have fueled localized criminal activity. Community surveys and feedback from host populations reflect growing perceptions of insecurity, placing additional pressure on already stretched law enforcement agencies and local administration.

Drug Trafficking and Abuse: Border Guard Bangladesh (BGB) regularly intercepts large quantities of Yaba (methamphetamine) tablets linked to trafficking networks involving FDMN or exploiting porous borders. A recent arrest seized 3,30,000 Yaba tablets in a single operation, highlighting the drug trade's scale and complexity. Analyses suggest that narcotics trafficking has become deeply integrated into some cross-border criminal circuits, with spillover impacts on local communities and contributing to widespread addiction and social disruption.[4]

Figure-3: Yaba Smuggling Routes

Source: DNC, Police and RAB

Militant Groups and Internal Violence: Over time, reports have pointed to the emergence and shifting influence of armed factions within the camps. Groups once associated with the Arakan FDMN Salvation Army (ARSA) have fragmented, with newer militant or organized criminal networks taking shape. These factions are often linked to targeted killings, intimidation, forced recruitment and extortion inside the camps. Their activities create fear among ordinary refugees and

complicate camp governance. In many cases, the line between political militancy and organized criminality has become blurred, deepening instability.[5]

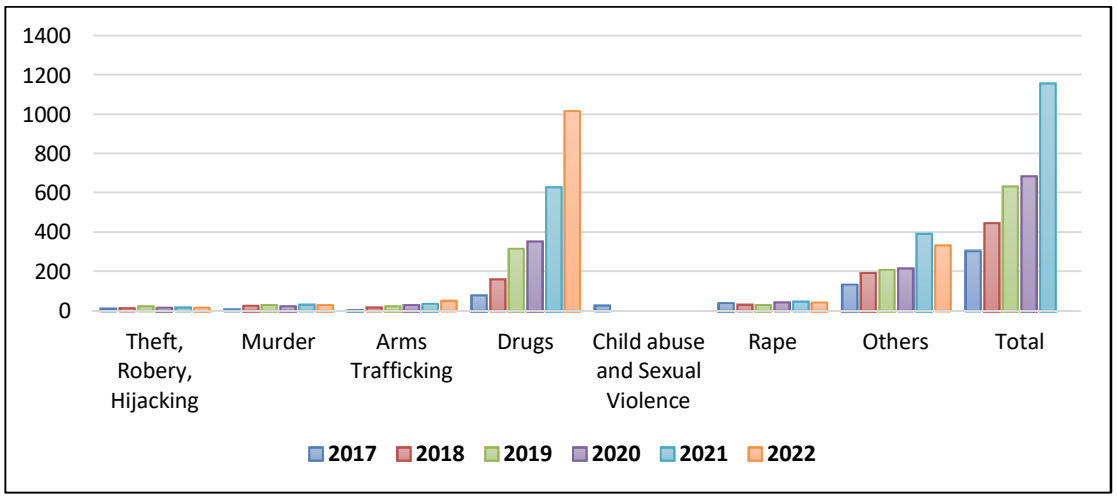
Economic and Labour Market Pressures: Refugee presence has exerted downward pressure on local wages and shared resources. Employers sometimes hire FDMN at low wages, undermining labour prospects for local populations and fueling resentment. Competition for limited opportunities has strained community relations and triggered social friction. Moreover, the cost of sustaining humanitarian operations, such as food, shelter, healthcare and sanitation, places a financial burden on Bangladesh's Government and humanitarian partners alike.[6]

Environmental Degradation: The sudden and large-scale expansion of camps required vast areas of forest land to be cleared for shelter, roads and basic facilities. This rapid deforestation has reduced tree cover, disrupted wildlife habitats and weakened natural drainage systems. As a result, soil erosion and landslides have become more frequent, especially during monsoon seasons. Increased flood risks and declining soil quality are affecting nearby communities as well. This is placing long-term pressure on local ecosystems and raising concerns about environmental sustainability.[7]

Health and Public Safety Concerns: Overcrowding inside the camps, combined with inadequate sanitation and overstretched WASH (Water, Sanitation and Hygiene) facilities, creates an environment where disease can spread quickly. Limited access to clean water and improper waste management increase the risk of waterborne illnesses such as diarrhea and cholera. Respiratory infections remain common due to dense living conditions and poor ventilation. Malnutrition continues to affect vulnerable groups, particularly children and pregnant women. Intermittent health services, often disrupted by funding shortfalls, further weaken prevention and response capacity. This leaves both refugees and nearby host communities exposed to potential outbreaks.[8]

Security, Extremism and Information Threats: Foreign and internal security analysts have noted the risk of armed FDMN factions adopting extremist rhetoric and recruiting vulnerable youth. This is potentially destabilizing border areas or infusing wider regional networks. These dynamics complicate humanitarian protection and risk conflating refugees with security threats. Additionally, dispersed FDMN networks outside the camps increase concerns about possible unauthorized access to sensitive information or exploitation by external groups, though systematic evidence on espionage remains limited.[9]

Figure-4: Crime Report of Ukhiya Thana-FDMN Held Area



Source: Chattogram Police Range DIG's office

Future Security Risks

The protracted FDMN crisis presents emerging security risks for Bangladesh that extend beyond immediate humanitarian concerns. Issues related to international reputation, cross-border insurgency spillover, economic strain and climate vulnerability are increasingly interconnected. These are shaping a complex security environment that demands careful management and sustained strategic attention, as outlined below:-

Smearing Bangladesh's International Image: Criminal incidents, illicit migration attempts and security-related cases involving FDMN individuals abroad risk damaging Bangladesh's international standing. Even when actions are carried out by a small number of individuals, the association can blur perceptions and complicate diplomatic engagement. Regional countries remain sensitive to irregular migration flows, trafficking networks and cross-border crime linked to displacement routes. If these patterns persist, Bangladesh may face increased scrutiny, tighter visa regimes for its citizens and reputational challenges in multilateral forums and bilateral negotiations.[10]

Insurgency and Extremism Spillover: Ongoing conflict inside Myanmar, particularly involving the Arakan Army and other armed actors, continues to destabilize Rakhine State. Renewed clashes have triggered fresh displacement and heightened uncertainty along the border. This fluid security environment complicates prospects for safe and voluntary repatriation. Prolonged instability also increases the risk of arms flows, militant linkages and radical narratives crossing into Bangladesh. Managing these dynamics demands sustained vigilance, strengthened border management and close monitoring of developments across the frontier.[11]

Economic Degradation and Climate Pressures: Hosting a large refugee population in climate-vulnerable places sustained pressure on Bangladesh's economy and environment. Rising sea levels, flooding, landslides and frequent cyclones already challenge local resilience. Concentrated settlements intensify demand for land, water, fuel and public services. Continued reliance on limited natural and financial resources risks widening humanitarian gaps and straining host communities. Without adaptive planning and climate-sensitive investment, these pressures could compound existing vulnerabilities and create long-term socioeconomic stress.[12]

Pragmatic Options and Strategic Policy Measures

Addressing the FDMN crisis requires a careful balance between humanitarian responsibility and strategic security planning. Policy responses must remain realistic, evidence-based and adaptable to changing regional dynamics. The following measures outline practical steps Bangladesh can pursue to manage risks while protecting national interests and upholding international obligations:-

Accelerate and Institutionalize Safe and Voluntary Repatriation: Bangladesh should continue structured dialogue with Myanmar and international partners to transform limited pilot returns into a credible, scalable repatriation framework. Previous engagements demonstrate that movement is possible under the right conditions. Any expansion must ensure voluntariness, safety guarantees, restoration of rights and independent international monitoring. Institutionalizing such a process would reduce uncertainty, ease camp pressures and reaffirm Bangladesh's long-standing position that repatriation remains the most sustainable solution.

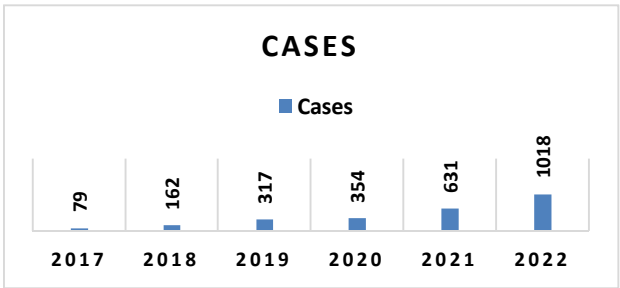
Strengthen Humanitarian Funding Partnerships: Sustained advocacy is needed to secure full funding for the Joint Response Plan 2025-26 and beyond. Funding shortfalls directly translate into reduced food rations, weakened healthcare delivery and limited protection services. Bangladesh, in coordination with UN agencies and donors, should broaden its diplomatic outreach to non-traditional partners and emerging economies. Ensuring predictable financing is critical not only for humanitarian continuity but also for preventing instability that could arise from unmet basic needs.

Enforce Comprehensive Refugee Management Policy: Maintaining updated and accurate biometric registration of all FDMN, including new arrivals, is essential for effective planning and resource allocation. A structured refugee management framework should regulate movement while incorporating humanitarian safeguards. Strong oversight can help prevent unauthorized migration, trafficking and identity misuse. Clear administrative procedures also strengthen transparency and accountability, reinforcing public confidence in state management of the crisis.

Enhance Law Enforcement and Intelligence Capability: Security agencies should continue strengthening intelligence-led operations to disrupt drug trafficking routes, arms smuggling networks, organized crime and militant recruitment efforts. Effective coordination among BGB, police, intelligence units and local community representatives is essential for early warning and rapid response. Building trust within camps through community policing initiatives can further improve information flow and reduce the influence of criminal elements.

Table-2: Drug Related Filed Cases

Year	No of filed Cases
2017	79
2018	162
2019	317
2020	354
2021	631
2022	1018



Source: Ukhiya Thana

Expand Legal and Social Protections: Robust enforcement of laws addressing exploitation, trafficking and abuse is critical to protecting vulnerable populations. Gender-based violence prevention programmes, safe spaces and psychosocial support services must be reinforced, particularly for women and children. Legal awareness campaigns within camps can empower individuals to report abuse and seek assistance. Strengthened protection frameworks contribute directly to both humanitarian well-being, broader security and stability.

Environmental and Infrastructure Interventions: Targeted investment in reforestation, soil stabilization and improved drainage systems can reduce erosion and landslide risks. Upgrading WASH infrastructure will help mitigate health hazards and improve living standards. Climate-resilient shelter design and disaster preparedness measures are equally important in a cyclone-prone region. Environmental restoration initiatives should involve both refugees and host communities, fostering shared responsibility and reducing local tensions.

Economic Inclusion and Education: Within existing policy boundaries, partnerships with international organizations can expand vocational training, skill development and small-scale livelihood initiatives. Structured programmes reduce idle time among youth and lower vulnerability to criminal recruitment. Expanding access to quality education, particularly for adolescents, helps build resilience and preserve prospects. Carefully designed economic activities can balance humanitarian considerations with national policy constraints.

Strengthen Border Security and Regional Cooperation: Upgrading border monitoring systems through advanced surveillance technology, additional border outposts and community engagement will enhance interception of smuggling and unauthorized crossings. Regional cooperation with associated stakeholders should focus on intelligence exchange, migration management and counter-trafficking initiatives. Coordinated diplomatic engagement can address cross-border risks more effectively than unilateral action, reinforcing collective regional security.

Conclusion

The FDMN of Myanmar remains one of the world's most persecuted communities. The 2017 crisis, described by the UN Human Rights Commissioner as "a textbook example of ethnic cleansing" and labeled as a 'genocide' by the US, forced hundreds of thousands to seek refuge in Bangladesh.[13] Previous influxes in 1978, 1991-92, 2012 and 2016 were comparatively smaller and more manageable, but the 2017 arrival of approximately 7,40,000 traumatized individuals is unprecedented in scale and complexity.

Bangladesh, despite its limited economic capacity, provided comprehensive humanitarian support. Today, the number of FDMM in Cox's Bazar and Bhasan Char exceeds 1.3 million, creating the world's largest refugee camps. Such huge number of hapless men, women and children remain stateless, without formal refugee status and heavily dependent on international assistance and this is gradually declining. Eventually, socio-economic pressures and overcrowding have contributed to inter-group violence, criminal activity and organized illicit networks within the camps. Emerging threats such as drug trafficking, arms smuggling, human trafficking and internal security risks pose potential regional spillover effects, if not carefully managed.

To address these challenges, Bangladesh continues limited repatriation efforts and the settlement of FDMN in Bhasan Char.[14] Besides, Bangladesh is implementing multipronged strategies involving law enforcement, humanitarian support and diplomacy. The cooperation of Myanmar, the international community and key global actors such as China, India and the US is crucial. Sustained funding, protection of human rights, strict law enforcement and continuous monitoring are essential to prevent destabilization. At the same time, safe, voluntary and mutually agreed repatriation must remain at the top priority, complemented by justice through international mechanisms like the International Court of Justice (ICJ) and the International Criminal Court (ICC) .[15]

Bangladesh must balance humanitarian responsibility with national security imperatives. By combining strategic planning, international cooperation and robust protection measures, the country can manage current pressures, mitigate future risks and support the FDMN in a dignified and sustainable manner.

Recommendations

Drawing from the historical roots of the FDMN crisis, the present state of the FDMN influx in Bangladesh, emerging internal security threats, future security risks and pragmatic options and strategic policy measures, the following recommendations are put forward in this article:-

- The Government of Bangladesh should pursue repatriation and continue its diplomatic efforts with the international community to put pressure on Myanmar.
- The current cadastral survey should include previously intruded FDMN for preparing a comprehensive database.
- Law-enforcing agencies should maintain 'zero tolerance' for communal crimes, drugs, arms and human trafficking.
- The intelligence and law enforcement agencies should be actively involved and vigilant in identifying any sort of radicalism/terrorist activities among the FDMN community.
- A political and social awareness programme should be planned to prevent the misuse of refugees for their own benefits by vested groups.

Notes and References

1. I. Ahmed, *The Plight of the Stateless FDMN*, Cambridge: University Press, 2010.
2. M. K. Singh, *FDMN Refugees: Bangladesh's Burden to Bear*, New Delhi: Aarti Prakashan. 2018.
3. M. Yegar, *The Muslims of Burma: A Study of a Minority Group*, Wiesbaden: Harrassowitz Verlag, 1972.
4. A. Razzaq and M. Haque *A Tale of Refugees: FDMN in Bangladesh,* Centre for Human Rights, 1995.
5. U. Rahman, 'The FDMN refugee: A security dilemma for Bangladesh,' *The Journal of Immigrant and Refugee Studies*, 2010. http://www.tandfonline.com/doi/abs/10.1080/15562941003792135
6. M. H. Ismail et al, 'The FDMN refugee crisis: A threat to peace and security in South Asia,' *The International Journal of Community and Social Development*, 2021. https://journals.sagepub.com/ doi/abs/10.1177/25166026211028365
7. *Ibid*.

8. 'FDMN influx and socio-environmental crisis in Southeastern Bangladesh,' *Sage Journal*, 2022. https://journals.sagepub.com/doi/full/10.1177/25166026211067604, 25 January 2022.

9. H. Takemura, *Background to the FDMN crisis: The FDMN crisis and International Criminal Court*, Springer, 2023. https://link.springer.com/chapter/10.1007/978-981-99-2734-0_2, June 2023.

10. M. M. Hasan, 'Repatriation of FDMN: A Holistic Approach,' *Individual Research Paper*, Defence Services Command and Staff College, Bangladesh Army, 2020.

11. M. A. Hasan, 'Influx of FDMN and its impact on the sovereignty of Bangladesh,' *Individual Research Paper,* Defence Services Command and Staff College, Bangladesh Army, 2018.

12. Wing Commander M. N. Islam, 'FDMN crisis: Forced migration as non-traditional security threat and lessons for Bangladesh Airforce,' *Individual Research Paper,* Defence Services Command and Staff College, Bangladesh Army, 2021.

13. Brigadier General A. Z. Islam, 'Rethinking strategic partnership of Bangladesh for resolving FDMN crisis: Challenges and possibilities,' *Individual Research Paper,* National Defence College, Bangladesh, 2022.

14 P. Hasan, 'Bangladesh's Bhasan Char project: An example for world to deal with refugees?' OpEd, *Eurasia Review.* https://www.eurasiareview.com/17082021-bangladeshs-bhasan-char-project-an-example-for-world-to-deal-with-refugees-oped/, 2021.

15. M. R. Uddin, 'The FDMN refugee crisis: Socio-economic and environmental impacts on local community in Bangladesh,' *Journal of Asia-Pacific Studies*.https://www. researchgate. net/publication/354203132_The_FDMN_Refugee_Crisis_Socio-Economic _and_Environmental_ Impacts_on_Local_Community_in_Bangladesh, August 2021.

Brief Biography

Brigadier General Md Humayun Kabir, SUP (BAR), SPP, ndc, psc, MPhil was commissioned on 13th December 1996 with 35th Bangladesh Military Academy (BMA) Long Course in the Corps of Infantry. He has diverse experience across staff, instructional and command appointments. In addition to all the regimental appointments, he served as Directing Staff at the School of Infantry and Tactics and Defence Services Command and Staff College. He also served as Adjutant and Platoon Commander at Bangladesh Military Academy, Grade-3 Staff Officer and Brigade Major in an Infantry Brigades, as well as Colonel Staff at Military Training Directorate, Army Headquarters. He commanded an Infantry Battalion and two Infantry Brigades. Academically, he holds a Bachelor degree in Computer Science from Peshawar University, Pakistan, a Master Degree in Military Studies from Bangladesh University of Professionals, a Master Degree in Defence Studies from King's College London, an MPhil from Madras University, India, Chartered Management Institute (CMI) Level 7 and Postgraduate Diploma in Strategic Management and Leadership from United Kingdom (UK). Besides all the mandatory courses, he has undergone Army Staff Course in Bangladesh, Advanced Command and Staff Course in UK, National Defence Course in India and Senior International Defence Management Course in the United States. He served under the Blue Helmet in United Nations Mission in Democratic Republic of Congo and Ivory Coast. Presently, he is serving as Director, Military Training Directorate at Army Headquarters.

The 5th Domain: Cyber Power as an Instrument of Modern Statecraft

Colonel A K M Abdur Rahman Ferdous, psc

Abstract

The 21st century has redefined state power, introducing cyberspace as a pivotal, yet volatile, domain of international conflict. Cyber is an indispensable instrument of modern statecraft. This shift is driven by the rapid global integration through information technology, giving rise to Cyber Power - the strategic ability to exploit digital systems for national advantage. This power is dual: encompassing both the physical infrastructure and the virtual domain. Cyber operations offer unique advantages over conventional means, including stealth, plausible deniability and the ability to conduct long-term espionage (SolarWinds) or cripple vital services (Estonia attacks). The threat landscape has become further complicated due to cybercrimes through models like Ransomware-as-a-Service. The evolution of digital conflict i.e., causing devastation by malware, highlights the growing maliciousness of cyber weapons. However, the core challenge for modern militaries is the integration of cyber capabilities into Multi-Domain Operations (MDO) while managing the extreme risks of escalation. Conventional deterrence fails in cyberspace due to the difficulty of identifying the adversary precisely and the prevalence of plausible deniability. Therefore, national strategies need to be defined according to 'Deterrence by Denial,' focusing on improving network resilience and defence. For rapidly digitizing developing nations like Bangladesh, cyber vulnerability is a direct threat to national sovereignty. Recurrent incidents, in the key financial organization, highlight systemic weaknesses like poor security awareness and a lack of skilled personnel. To secure its digital ecosystem, Bangladesh need to enforce a unified regulatory framework, implement secure architectures like Zero Trust and prioritize investment in a national cyber workforce. However, the future of the national security and sovereignty will be determined by its mastery over immensely powerful cyber domain, the fifth domain of warfare.

Keywords*: Cyber Power, Cyberspace Conflict, Statecraft, Digital Infrastructure, Cyber Warfare, Multi Domain Operations (MDO), Deterrence by Denial, Cybersecurity, Resilience and National Sovereignty.*

Introduction

The 21st century brought new battlefields. These are not fields of mud and blood. The landscape of international conflict has fundamentally changed. Traditional power structures now bound to coexist with a new domain called cyberspace. They are fields of data and code. Swift development and quick integration of information technology around the globe has rapidly affected military affairs. There is no ambiguity that technology is the fastest ever evolving challenge to be managed by any government let alone military. The exponential development in modern technology has brought drastic changes in every aspect of human life including business,

daily life management and security as well. Altogether, cyber has a great dominance over statecraft and military strategy of each and every country in reality cyber has appeared as indispensable in daily life either in competitive form or in a form of confrontation. Eventually, this evolution gave rise to the concept of Cyber Power. In present day word, cyber has changed the concept of operations that how nations fight. Though this cyber is silent but to be pragmatic it's a powerful force.

Evolution of Statecraft in Digital Age: The struggle to understand cyber conflict is not entirely new. Since the invention of computer and internet military is confronting cyber as a war-fighting domain. But, the inclusion of cyber in war strategies and military doctrine is still in its infancy. This doctrinal immaturity presents substantial risks for conflict escalation. If states lack clear rules and vision dealing with cyber then destruction and devastation in all the aspects that depends on information and data management is inevitable. Therefore, nation needs a clear and mature understanding of cyber capabilities. In doing so, state must accelerate the development of robust cyber strategies. A clearly defined operational limit and boundaries must be declared before a major cyber-attack is already in effect by invisible adversaries. This robust consensus is extremely essential to mitigate the risk of any sabotage activities on to national interest.

Defining Cyber Power: Cyber Power may be defined as the ability to exploit cyberspace in order to obtain advantages in desired terms and conditions. It can dominate over various operational domains which are directly or indirectly depend on software-controlled mechanism. However, national cyber power is simply a country's ability to pursue its objectives using cyber means. To truly possess significant cyber power, a country needs to set clear national objectives within cyberspace.[1] It must possess the essential capabilities to pursue the desired goals using cyber methods. Cyber power is characterized by two dimensions viz. physical and virtual. The physical dimension includes all tangible elements of cyberspace. This includes infrastructure, hardware, data centres, servers, and network cables. However, the virtual dimension is less tangible but crucial. It comprises software programmes, digital algorithms and data.[2] Cyber power's duality has deep significant strategic implications. Any failure in the virtual domain can lead to catastrophic destruction in the physical world. For instance, virus or malware being a code falls entirely under virtual domain. But advanced malware possesses all the potentials to manipulate, damage or destroy physical machineries. This manipulation at times can cause catastrophic damage to real-world infrastructure. [3] Therefore, national and military strategy, either defensive or offensive must integrate Information Technology (IT) as an indispensable part of cyber security.

The Strategic Utility of Cyber Operations: Cyber operations offer unique strategic advantages which are almost impossible to achieve through conventional means. They provide stealth action with a measure of plausible deniability.[4] This ambiguity has established it to be a useful instrument in any covert operation. Cyber means are increasingly used for long-term

intelligence collection. Adversaries often compromise networks not for immediate destruction, but to achieve a long-term goal without physical confrontation.[5] Cyber-attacks are highly disruptive. They can cripple command and control, financial systems, or infrastructure rapidly or at some precise date and time. In fact, cyber operations appear to be a very effective tool alternative to physical engagement.[6] When direct military confrontation is not politically or geographically viable or too costly, cyber-attacks come into effect helping to achieve the optimum result with minimal use of physical resources. Nowadays, many states and non-state actors utilize cyber power on their adversaries to bring significant strategic effects and consequences. No doubt that this requires robust intelligence gathering on adversaries' infrastructures, plans, intentions, activities and modus operandi.

Escalating Cost of Cyber Conflict: Cyber is not solely the tools of statecraft. It is also in the hand of global criminals to gain financially. It predicted to cost the world around 9.5 trillion USD by Cybercrime in 2024.[7] These costs are predicted to grow significantly over the years. Estimates suggest that in the coming days the damage costs will increase by 15% every year.[8] However, the trajectory places the total annual cost at 10.5 trillion USD by 2025. This enormous financial flow dictates the graveness of the threat. Cyber criminals are overwhelmingly motivated by money. This profit motive drives innovation in criminal toolkits. The average cost of a single data breach reached 4.88 million USD in 2024.[9] This is the highest average cost ever recorded. The high financial motivation of criminal (hacker) groups creates significant challenges for states. These groups develop sophisticated tools. They extract Ransomware-as-a-Service (RaaS) from the victims. State actors at times exploit these highly professionalized criminal networks to subdue the adversaries. They can utilize criminal tools or mask their own intelligence operations using techniques common to financial cybercrime. Governments must therefore combat both organized crime and state-sponsored espionage simultaneously. The unethical financial gain or technological theft-based incentive structure continually upgrades the capabilities available to hostile actors around the globe.

Historical Roots of Digital Conflict

The evolution of cyber conflict spans decades. It jumped from theoretical concepts to devastating weapons state over the years.[10] Understanding this history is crucial to grasp current strategic challenges.

Origins of Theoretical Malware to the First Worms: Malware is a contraction for "malicious software." It was developed in the early age of computer and got momentum with the development of internet. In fact, refers to any self-replicating software, code, or computer programme intentionally designed to damage, disrupt, or steal data from a computer system. Billions of malware attacks take place every year, targeting not just huge corporations but also

individuals. Malware can infect any operating system, whether it is Windows, Mac, iPhone, and Android. Cybercriminals, commonly known as hackers develop and use malware to:

- Lock up devices, sensitive data, or entire corporate networks for ransom.
- Gain unauthorized access to sensitive data or digital assets.
- Steal login credentials, credit card numbers, intellectual property, personally identifiable information or other valuable information.
- Disrupt critical systems that businesses and government agencies rely on.

Virtually every modern cyber-attack involves some type of malware. So, malware may be termed as a digital weapon, built to cause chaos, steal, or hold assets hostage for cash. These harmful programmes can range in severity from highly destructive and costly to merely annoying but inoffensive. However, malware is the general term describing a huge family of digital threats that are shown in Table 1.

Table-1: Family of Malware

Malware	
Viruses	Malicious programme that requires human interaction (e.g., clicking a link, launching a program) to replicate.
Worms	Self-replicating programmes that does not require human interaction to spread across a network independently.
Botnets	Network of infected computers under the control of a single attacker ("bot-herder") working in unity.
Ransomware	Locks users out of critical systems or sensitive data and demands an exorbitant ransom for access.
Multi-extortion ransomware	Adds layers of damage/pressure to a ransomware attack. e.g., Double-extortion: encrypts data AND threatens to leak exfiltrated sensitive files.
Macro viruses	Embeds malicious software into programmatic macros within application files; executes when the programme is opened.
Trojans	Disguises itself as a useful or legitimate software and once inside the system create backdoor for the attacker.
Spyware	Hides in an infected system to secretly gather sensitive information and transmit it back to an attacker.
Adware	Typically bundled with free software; displays unwanted advertisements and may sometimes harvest data or redirect browsers.
Rootkit	A malware package that allows hackers to gain privileged, administrator-level access to a computer's operating system.

Source: Author's self-construct

The Rise of Malware and Sophisticated Attacks: Pioneering mathematician John Von Neumann (1903-1957) first developed the theoretical concept in 1966. This programme was imagined as something that could reproduce and spread itself throughout a system. Later, the theory became reality in 1971 with the Creeper Worm. This programme demonstrated the potential for network propagation. The concept remained primarily an academic curiosity for several years. The Elk Cloner Virus appeared in 1982. It became the first major, widely documented computer infection. The Brain Virus (1986) marked the beginning of malware specifically targeting personal computers. A major turning point occurred in 1988 with the Morris Worm. This worm caused significant and noticeable disruption across the nascent internet (networks like ARPANET). These early attacks showed the power of malware and established the fact that digital threats were pragmatic and unavoidable. Due to the large volume and wide variety, a complete history of malware would be quite lengthy. Instead, a few milestones in the evolution of malware are shown in Table-2:-

Table-2: Historical Chart of Malware[11]

Year	Malware/Concept	Significance
1966	Theoretical malware (Von Neumann's work)	Provided the theoretical foundation for self-reproducing programmes (computer viruses).
1971	Creeper Worm	First known example of a worm, designed to move and copy itself across the ARPANET with a message; "I'M THE CREEPER. CATCH ME IF YOU CAN!" It was non-malicious.
1982	Elk Cloner Virus	First known virus for Apple computers; spread via infected floppy disks (boot sector virus).
1986	Brain Virus	Considered the first virus for the IBM Personal Computer; spread worldwide via floppy disks to prevent piracy.
1988	Morris Worm	It was created by Robert Tappan Morris (1965-today) and was meant to measure the internet's size. But it copied itself too much and slowed down thousands of computers. It showed how vulnerable networks were.
1999	Melissa Worm	This was an email-based virus. It could spread fast and overload email servers which caused widespread disruption.
2000	ILOVEYOU virus	First significant piece of malware spread via email; stole passwords, deleted files and was an early example of phishing.
2003	Slammer Worm	This worm spread incredibly fast. It attacked SQL servers and disrupted airline flights, ATMs and even caused a nuclear power plant's safety system to go offline.

Year	Malware/Concept	Significance
2004	Mydoom Worm	Spread rapidly via email, hijacking computers to send more copies; accounted for 25% of all emails sent worldwide (a record).
2007	Zeus Virus	Demonstrated the dangerous potential of a trojan-style virus; infected via phishing and drive-by-downloads.
2013	CryptoLocker ransomware	One of the first instances of ransomware; used powerful encryption to target data and requested a ransom in Bitcoin.
2014	Emotet trojan	Prime example of polymorphic malware (alters its code to evade detection); used to deliver other forms of malware.
2016	Mirai botnet	Targeted weak security in IoT devices (like CCTV cameras) and launched massive Distributed Denial-of-Service (DDoS) attacks.
2017	Cyber espionage (NotPetya, WannaCry)	Banner year for state-sponsored cyberattacks; NotPetya (wiper worm) and WannaCry (ransomware) were enabled by the Eternalblue exploit.
2019	Ransomware-as-a-Service (RaaS)	A troubling trend where professional hackers offer "plug-and-play" ransomware protocols for a fee, lowering the skill barrier.
2021	Colonial Pipeline attack	High-profile double-extortion ransomware attack that impacted both public and private sectors, prompting a temporary US state of emergency.
2022	Costa Rica cyberattack	A series of highly targeted ransomware attacks that crippled government systems; first country to declare a national state of emergency in response to a cyberattack.

Source: Author's self-construct

Rise of Espionage and Financially Driven Threats: In late 1990s and early 2000s the malware rapidly got raised in its reach and maliciousness. The Melissa Worm (1999) used email to spread rapidly across major systems. The Mydoom Worm (2004) set records for the speed of its infection rate. Thereafter, malware development soon pivoted toward clear financial objectives. The Zeus Virus emerged in 2007. It was effective to steal financial credentials. This was an early indicator of financially motivated cybercrime. In 2013, the Crypto Locker ransomware appeared. It dramatically popularized the ransomware attack model. The Emotet Trojan (2014) became a primary delivery mechanism. It was used to introduce other, more damaging malware onto compromised systems. The Mirai Botnet (2016) weaponized everyday Internet of Things (IoT) devices on a massive scale. This demonstrated the vulnerability inherent in present days interconnected consumer electronics.

The Dawn of Cyber Warfare-Nation-State Capabilities: By 2017, cyber espionage had firmly established itself as a critical element of statecraft. State adversaries began to focus their efforts on high-value targets. Supply chain attacks emerged as an effective tactic. This method allows adversaries to compromise a trusted vendor once. It compromises grants scalable, persistent access to thousands of victim networks simultaneously. The high profitability of cybercrime professionalized these tools globally. RaaS models were widespread by 2019. The proliferation of RaaS in the hand of states or non-state groups lowered the necessary technical threshold for conducting complex, destructive attacks. It forces national defence planners to extend their horizon on scrutiny beyond state adversaries unto the cyber-criminals. The seriousness of these threats getting undeniable day by day. Even cyber operations at times put governments/governing bodies at a fix.

Case Studies in Strategic Goal Attainment

Cyber operations are judged by their ability to achieve their intended political or military goals. The success rate varies widely, demonstrating the inherent unpredictability of this domain. Thus, cyber warfare opens the door of a new era of conflict. As nations became more and more connected over internet, the favourable condition for cyber warfare goes up. This involves using cyber-attacks against an adversary to cause either disruption, espionage or destruction at a particular arena.

Estonia Cyber Attacks (2007): Estonia faced massive cyber-attacks. Government, bank, and media websites were hit. These attacks used 'denial of service' (DoS) tactics. They overwhelmed servers with traffic. This made websites unavailable. They showed how a small country could be crippled digitally.

Stuxnet (2010): In 2007, Stuxnet is the first finest example of cyber where it is used as a weapon. It was a game changer and was meticulously designed to inflict physical damage to Iran's nuclear facilities. The strategic objective was to delay the uranium enrichment programme by destroying the physical properties of industrial machinery used. Iran's nuclear facilities was physically isolated from the general internet. Stuxnet overcame this formidable defence. It was engineered to be hand-carried into the Natanz plant. Stuxnet copied itself onto any inserted removable drive. This was the primary method of propagation across the separated internal networks. Once inside, Stuxnet targeted the Programmemable Logic Controllers (PLCs) of the industrial control systems (SCADA) at Natanz, by which the precise spinning speed of the centrifuges were controlled. Stuxnet manipulated the speed outside acceptable operational parameters that caused significant destruction on the uranium enrichment project and enforced delay on the overall project. This caused physical damage without direct military action. However, Stuxnet proved cyber-attacks could cause real-world physical damage. It showed that digital weapons could be as powerful as bombs.

Sony Pictures Entertainment Attack (2014): A group called 'Guardians of Peace' attacked Sony. They stole vast amounts of data on unreleased films and employees' information. Later they publicized this data. This showed how cyber-attacks could be used for political revenge.

WannaCry Ransomware (2017): This was a global attack, crippled hospitals and businesses worldwide affecting hundreds of thousands of computers. It encrypted users' files and demanded a ransom in Bitcoin. It showed how cyber criminals could cause massive economic damage.

NotPetya (2017): The malware was merely camouflaged as a ransomware where its main goal was destruction by deleting data across the targeted network. It is thought to be developed targeting Ukraine but damaging datas worth billions of dollars around the globe which caused an international chaos. In fact, NotPetya demonstrates that it's hard to keep cyber weaponry confine within geopolitical boundary. Their rapid, automated spread carries significant collateral risk. This uncertainty limits their utility as precise, strategic instruments of might.

SolarWinds (2020): The SolarWinds attack, disclosed in 2020, demonstrated its stealth ability of supply chain penetration. Adversaries successfully compromised a legitimate software vendor. This allowed them to inject malicious code into trusted software updates. This tactic granted persistent, stealthy access to networks belonging to thousands of victims. The strategic goal of the SolarWinds operation was not disruption or immediate destruction, rather it was much more sophisticated. Long-term espionage and intelligence gathering were its ultimate objective. SolarWinds revealed that defending the network perimeter is no longer sufficient. Adversaries are keen to achieve their desire either by hook or by crook and exploitation of the implicit trust placed on third-party software suppliers could be a lucrative choice in this regard.

Balancing Conventional and Cyber Warfare

The integration of cyber capabilities into traditional military doctrine is the greatest strategic challenge of the modern era. States must find a balance that leverages the power of cyberspace while controlling the inherent risks of escalation.[12]

Challenge of Domain Integration: Cyber is considered as the fifth dimension of war. Integrating cyberspace in military is still an evolving stage. Modern militaries are moving toward MDO that seeks to achieve converging effects across all warfighting domains like land, sea, air, space and cyber.[13] Successful integration demands a highly professional, well-trained workforce along with technology. These personnel need to maintain expertise within a rapidly and continuously fluctuating threat landscape. The ultimate goal of MDO is to create a highly integrated, data-driven environment. This environment is commonly known as Network Centric Warfare (NCW) where cyber command plays the overall pivotal role. This allows all to remain

informed about the ongoing development and helps faster decision making and execution of the same in any crisis. Cyber command ensures cross-domain secure data network where Zero Trust is exceptionally essential in every aspect. It ensures overall cybersecurity and safety in any complex and volatile operational scenario. The success of modern warfare depends entirely on bridging the technical and human expertise gaps that separate the cyber domain from conventional domain.[14]

Deterrence in Cyberspace: Cyber conflict creates puzzle in the whole process of strategic decision-making process that how a conflict might escalate. This lack of clarity is very dangerous. A country could see a very damaging cyber-attack before military actions as a reason to go against the interest of some other states. This risky situation exists because of the problems of determining the identity of the actor with evidences and as the intent of the attack remains unknown.[15] Cyber-attacks often operate below the traditional legal threshold of armed conflict. Yet, as demonstrated by Stuxnet, they can inflict devastating damage. States need to develop cyber doctrines establish clear frameworks defining how they intend to use their cyber capabilities.[16] These frameworks are essential for managing escalation risk. Maintaining cyber dominance is now an unavoidable and necessary aspect of maintaining strategic peace between rival states. If an attack cannot be definitively attributed, any capability of conventional retaliation threat might not be effective. A strong cyber command with both defensive and offensive expertise can deter such attacks. Knowing an adversary can hit back digitally might make the attacker think twice.

Safeguarding Sovereignty: **Vulnerabilities and Recommendations for Bangladesh**

The rise of cyber operations directly endangers the sovereignty of the developing nations. Bangladesh being developing country, undergoing rapid digitalization, is already at huge cyber risks. Securing its digital ecosystem is vital for protecting its national interests. The fast digitization growth in Bangladesh has brought a huge surge in cyber threats. By one estimate, the country faced over 63 million cyber-attacks in a single year.[18] This scale of threat demands strong cyber defence. Sectors important for the economy, administration and security are highly vulnerable. These include finance, health, communication, transport, power and defence. Attack on any of these systems could cause widespread chaos. This would cripple businesses and daily life.

Past incidents prove that there are major weaknesses in the Bangladesh system. Cyber-attack on a key financial organization in 2016 was a major digital heist of over $80 million. Again, some Airlines email server was hacked in 2023. These repeated incidents suggest that the problems are not just technical flaws rather there are inherent problems that need to be fixed. The issues may stem from lack of interest in security, weak internal rules, deserted individual in the system or policy execution deficiencies.

Challenges to National Cyber Security: Bangladesh currently faces huge problems in boosting its national cyber defence. These obstacles are complex and part of the system itself.

- Awareness and training are very low in every sector. Many people and organizations lack the basic cyber hygiene needed to stop simple attack.
- Financial and technical support put into cyber security are often inadequate.
- Country has a scarcity of cyber experts. Lack of professionals directly hurts the nation's ability to set up and maintain modern cyber defences.
- Cyber related irregularity issues are yet to be solved. Bangladesh lacks a complete and consistent cyber security plan. Almost all the sectors are reluctant following even the existing policies. Moreover, security providing groups do not work in coordination, which stops a unified national defence effort.

A nation's dominance over cyberspace primarily depends on its professionals. Therefore, funding for development of cyber must be treated as a top strategic priority and with the highest importance.

Strategic Recommendations Based on the 2021-2025 Framework: The Bangladesh Cyber Security Strategy (BCSS) 2021-2025 set out a strong plan[19] where national vision to establish a secure and resilient digital ecosystem is orchestrated. The following recommendations stress out the need to quick implementation and enforcement of the plan across all the key areas to safeguard national digital sovereignty. In this regard strategic vulnerability matrix of Bangladesh and countermeasures are highlighted below in Table 3:-

Governance and Regulatory Enhancement: The goal here is to create a strong, flexible means to govern cyber security. It requires writing and updating policies, laws, and rules as well as involves working with all stakeholders. The government should set up one single, strong, independent regulatory body. This group must have the power to enforce strict rules based on risk. This enforcement must cover all Critical Information Infrastructure (CII). This action will help fixing current problems with poor coordination and uneven policy enforcement.

Protecting Systems and Personnel: The main objective is to protect vital services and critical information systems. Key steps include making security much stronger and improving our ability to respond to attacks. It also put emphasis on promoting secure development practices and regularly testing for weaknesses. All essential systems like finance, power, health, communications, and the military must move to a Zero Trust Architecture. This is crucial for operating securely in today's highly integrated world environments. This change will shift the national defence strategy toward stopping attacks before they start (Deterrence by Denial).

Research and Development of Human Resource: The aim is to build national strength through training, education, and awareness. Steps focus on creating an efficient group of cyber professionals. Centres of Excellence and supporting local Research and Development (R&D) have to be highly prioritized. A National Cyber Reserve Force (NCRF) must be created. This force will use specialized volunteers and contractors. Its focus should be on quick response and teaching skills like Operational Technology (OT) security and digital forensics. Coordination with universities, bringing necessary changes in curricula is of high importance in order to address the critical shortage of skilled manpower.

Global Cooperation and Information Sharing: The goal is to boost international teamwork and information sharing. This involves joining global programmes and improving how we share threat intelligence. It is also vital to build strategic partnerships with technologically advanced countries and companies. These partnerships must focus on sharing technology and intelligence. Working with others can greatly improve the ability of Bangladesh to find and track complex, state-sponsored attacks.

Table-3: Bangladesh strategic vulnerability matrix and countermeasures

Vulnerability	Threat	Strategic Objective (BCSS 2021-2025)	Recommendation
Financial Integrity	2016 Bank Heist	Safeguard critical information infrastructure	Zero Trust Architecture to be implemented
Shortage of skilled manpower	Inadequate incident response capability	Build national capability through training	In collaboration with universities specialized national operational training centres need to be established
Governance & Enforcement	Inconsistent policy implementation	Develop a robust governance framework	Independent authority to be developed to enforce compliance across all CII sectors
Supply Chain Trust	Dependence on foreign systems	Foster innovation and R&D	National certification scheme for essential IT products to be implemented.[14]

Source: Author's self-construct

Conclusion

Cyber operations have already turned into a potent instrument of power. It possesses the capability to play in international politics. Cyber being silent game changer, today stands as a central, non-negotiable instrument of statecraft. The Stuxnet attack proved that cyber power being virtual can achieve the goals in reality. Besides, trillions of dollars hacked by cyber criminals has aggravated the threat landscape for all the nation. In this scenario, the main challenge for Bangladesh is integration of cyber into its dream of achieving MDO capability along with unconventional warfare. The main hurdle of employing cyber power lies in the ambiguity of identifying the attacker and the associated risk of escalation. Deterrence based on the threat of retaliation is limited by legal gray areas and technical uncertainties. Consequently, the route to stability necessitates strong resilience - a strategic shift toward deterrence through denial. For emerging economies, such as Bangladesh, safeguarding national sovereignty requires more than purchasing technology. It mandates comprehensive systemic governance reform, aggressive investment in human resource development and the strict enforcement of security protocols across all vital sectors.

The inability to secure a nation's digital ecosystem is no longer just an economic liability; it constitutes a direct, tangible danger to national security and global reputation.[19] The future effectiveness of statecraft will be judged by its command over this novel, intricate, and unpredictable cyber domain. Candidly, cyber- the silent game changer in any international conflict demands constant vigilance and smart strategy.

Notes and References

1. *Reconceptualizing Cyber Power*, The Belfer Centre for Science and International Affairs. Available at, https://www.belfercentre.org/publication/reconceptualizing-cyber-power.

2. Why Has the Concept of Cyber Power Become So Prevalent in National Doctrines and Strategies Recently? Are There Any Limitations or Risks of Using This Concept? - No. 14, 2024, PIR Centre. Available at, https://pircentre.org/en/editions/14-2024-why-has-the-concept-of-cyber-power-become-so-prevalent-in-national-doctrines-and-strategies-recently-are-there-any-limitations-or-risks-of-using-this-concept/.

3. Ronald L. Monterey, *Shadows of Stuxnet: recommendations for U.S. policy on critical infrastructure cyber defence derived from the Stuxnet attack*, California: Naval Postgraduate School. Calhoun 2-2016. Available at, https://nsarchive.gwu.edu/sites/default/files/documents/3173339/Document-07.pdf.

4. 'Tipping the scales: the attribution problem and the feasibility of deterrence against cyberattack,' *Journal of Cybersecurity*, Oxford: Academic Press, Available at, https://academic.oup.com/ cybersecurity/article/1/1/53/2354517.

5. Understanding and Responding to the SolarWinds Supply Chain Attack: The Federal Perspective - FBI, Available at, https://www.fbi.gov/news/speeches-and-testimony/understanding-and-responding-to-the-solar-winds-supply-chain-attack-the-federal-perspective.

6. NotPetya, Ukraine, and the limits of economic impact from cyber-attacks, Available at, https://theloop.ecpr.eu/notpetya-ukraine-and-the-limits-of-economic-impact-from-cyber-attacks/.

7. Boardroom Cybersecurity Report 2024 - Secureworks. Available at, https://www.secureworks.com/centres/boardroom-cybersecurity-report-2024.

8. Top Cybersecurity Statistics for 2024 - Cobalt. Available at, https://www.cobalt.io/blog/cybersecurity-statistics-2024.

9. Cybersecurity Statistics and Trends, updated 2024 - Varonis. Available at, https://www.varonis.com/blog/cybersecurity-statistics.

10. Josh Schneider, *The History of Malware: A primer on the evolution of cyber threats*, IBM, Available at, https://www.ibm.com/think/topics/malware-history.

11. Ronald D. Lee, *Lessons Learned from the SolarWinds Cyberattack, and the Future for the New York Department of Financial Services' Cybersecurity Regulation.* Available at, https://www.arnoldporter.com/ en/perspectives/advisories/2021/06/lessons-learned-from-the-solarwinds-cyberattack.

12. *Multi-Domain Operations and Digital Transformation: Enabling Converged Effects in the Modern Battlespace*, NATO's ACT. Available at, https://www.act.nato.int/article/mdo-dt-enabling- converging-effects/.

13. Lt. Colonel Joe Mroszczyk, *Multi-Domain Effects Battalion: Space Integration and Effects in Multidomain Operations,* Army University Press. Available at, https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/March-2024/Multi-Domain-Effects-Battalion/.

14. Integrating the cyber domain in Multi Domain Operations, NRDC Italy. Available at, https://nrdc-ita.nato.int/newsroom/insights/integrating-the-cyber-domain-in-multi-domain-operations.

15. William Banks, 'Cyber Attribution and State Responsibility,' *International Law Studies*, p. 97 2021. Available at, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=2980&context=ils.

16. 1st Lt. Andrew Hu, *The Role of Cyber Conflict in Nuclear Deterrence*, The United States Army, 30 September, 2025. Available at, https://www.army.mil/article/288840/the_role_of_cyber_conflict_in_nuclear_deterrence.

17. Nathaniel Youd, *Cyber Deterrence: Is a Deterrence Model Practical in Cyberspace*? Space and Defence University of Nebraska, Omaha. March 2015. Available at, https://digitalcommons unomaha.edu/context/spaceanddefence/article/1122/viewcontent/Cyber_Deterrence_is_a_deterrence_ model_practice.pdf.

18. *Bangladesh Cybersecurity Opportunities*, International Trade Administration. Available at, https://www.trade.gov/market-intelligence/bangladesh-cybersecurity-opportunities.

19. *Bangladesh cyber security strategy 2021–2025*, Digital Watch, July 2021. Available at, https://dig.watch/resource/bangladesh-cyber-security-strategy-2021-2025.

Brief Biography

Colonel A K M Abdur Rahman Ferdous, psc was commissioned on 3rd December 1998 in the Corps of Signals with 39th Bangladesh Military Academy (BMA) Long Course. He is a graduate from Defence Services Command and Staff College, Mirpur and also graduated from Bangladesh University of Engineering Technology in the discipline of Electronic and Communication Engineering. He served as Instructor Class B in Signal Training Centre and School, Jashore Cantonment and Instructor Class A in School of Infantry and Tactics, Jalalabad Cantonment, Sylhet. In oversees capacity, he served in the UN Mission in Ivory Coast and Democratic Republic of Congo. Currently he is serving as a Project Director at Information Technology Directorate in the Army Headquarters.

Hologram Technology in Army Operations and Options for Bangladesh Army

Colonel Mohammad Mahmudur Rahman Niaz, SGP, psc

Abstract

Hologram Technology brought virtual communication to reality by applying light waves or laser beams to generate three-dimensional (3D) images, which appear to float in space. Hologram portrayed 3D display can assist precise perception of message, customised analysis and unleash emotions. Holograms offer realistic information and cost-effective preparation for a wide array of army missions or countering non-traditional threats. Its demand in army is increasing as it can assist mostly in reconnaissance, navigation, decision-making, training and deceiving enemy. Hologram is used to form deepfake as part of psychological warfare. This paper found that Bangladesh Army is not adequately prepared in aspects of research, standardised technology and skill to gain maximum dividend out of this. This paper mostly analysed secondary sources for logical reasoning and finally suggests few options to enhance preparedness. A survey result in the paper showed that 3D holographic technology is the most suitable for distance learning and conducting training. This paper suggests that coordination between all stakeholders, training, innovation and effective response plan are must to use Hologram Technology as a force multiplier. By research and development, Bangladesh Army should indigenously develop software and customize application to address crisis. Moreover, in the arena of United Nations (UN) Peacekeeping Missions also Bangladesh Army can use hologram for operational planning, humanitarian intrusion, logistics, resource allotment, critical investigation, situational awareness and security which will uphold the country's stance. The findings of this paper can contribute to further research to enhance capabilities in this regard.

Keywords*: Three-dimensional Images, Psychological Warfare, Deception, Deepfake, Laser, Simulation.*

Introduction

Present digital revolution has brought innovations in connectivity. Hologram Technology plays a key role in making virtual communication more realistic. This concept is no more confined to science fiction. Dennis Gabor (1900-1979), a Hungarian Electrical Engineer invented holography and won the Nobel Prize for this invention in 1971. The word is derived from two Greek words among which 'Holos' means whole and 'Grammas' signifies messages. Holography is the process of producing holograms. Hologram Technology applies light waves or laser beams to generate 3D images, which appear to float in space. Besides, holographic displays use acousto-optic materials and Spatial Light Modulators (SLMs) to project Computer-Generated Holographic

(CGH) images by a system using lasers and mirrors.[1] A huge amount of recorded information can be stored and reproduced precisely by Hologram Technology. However, application of holograms can portray realistic 3D display, assist precise perception of message, customised analysis and unleash emotions. Customised interpretation of desired information will be swift by integration of Artificial Intelligence (AI). Holographic Technology is becoming popular in sectors like defence production, medicine, weather forecasting, communication, digital art and security. Military strategists are particularly interested in the revolutionary development of holographic display technology at the backdrop of ever-changing battle or crisis scenario.

Any army commander should have updated intelligence on area of operation, situation and adversary for making decisions in own favour. Holograms offer the realistic information and cost-effective preparation for a wide array of army missions or countering non-traditional threats. Training considering virtual reality and depicting enemy reality is eased up by applying Hologram Technology. Holograms generate 3D replicas that support decision-making by displaying landforms, resources and workforces. Besides, coordination among deployed forces can be done by visualising 3D positions and motion vectors of all the assets in the battle space. Bangladesh poised as bridge between South and Southeast Asia, is surrounded by military superior states. Bangladesh's potential adversary has rich collection of modern and latest armaments. Innovative applications of hologram can assist Bangladesh Army to cover the inferiorities. Again, Bangladesh is one of the largest troops contributors in UN. Hologram projections can assist in effective operational planning there as well. So, Bangladesh Army needs to enhance inventory by indigenous production of hologram gadgets. Moreover, capacity enhancement of workforce and software development should also be given due importance.

At the backdrop of this context, in this paper an endeavour will be made to give an overview on functioning of hologram firstly. Then application of hologram in army operations and analysis of findings will be elaborated. Finally, this will suggest few options to ensure better preparedness for Bangladesh Army.

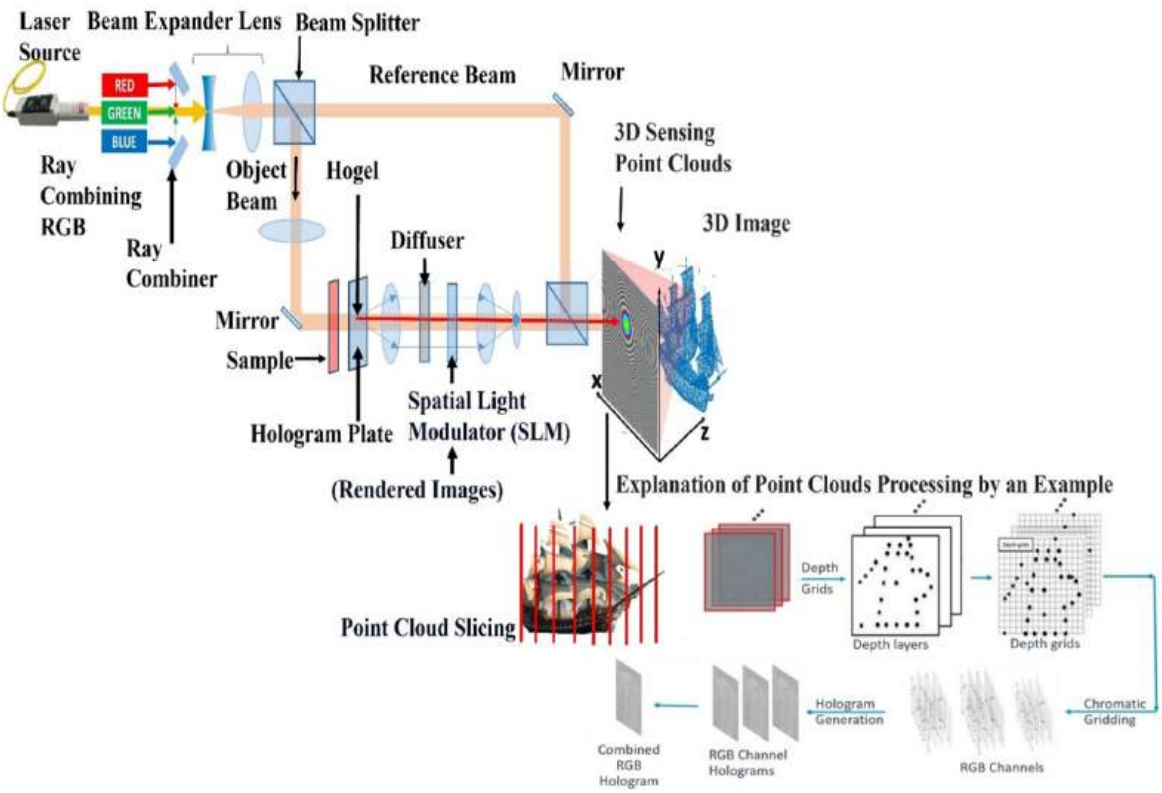
Basic Functioning

Required Equipment: For formulating hologram projections equipment like monitors, laser lights, various lenses, camera, audio-visual equipment and point cloud frame are required. Live or pre-recorded hybrid events are captured in a holographic capture studio. The projectors assemble photons to generate virtual images on a customised 3D projection curtain. Specialized LED panels and wings are needed to focus holographic contents. Transmitting software in server enable the delivery of captured or live events.

Process: The desired recording or live imagery is generated on a photographic screen. Here laser light with coherent property is applied as this light has a constant phase difference and

the same frequency. Then applied laser beam is bifurcated into two distinct beams by a semi-silvered mirror pyramid. This generates a light reflection beam and an object beam focused at varying angles. Among them, reference beam falls on the photo film after reflected by a mirror. The reflected beam progresses through various concave and convex lenses as object beam. This object beam passing through diffuser, spatial light and convex lens falls on the photo film. Both the laser beams after intersecting creates interference pattern and it is recorded on the film. This film has 3D sensing point cloud capabilities. This superimposes sliced layers of grids to formulate hologram and it is explained in Figure-1. Human eyes see many stationary images sequentially from different angles and brain interprets them as moving images. The pulsed laser firing for a minute fraction of a second can depict still holograms in motion. Special effects (SFX), visual effects (VFX) and motion tracking are three additional techniques extensively used in hologram production.[2]

Figure-1: Formation of hologram images

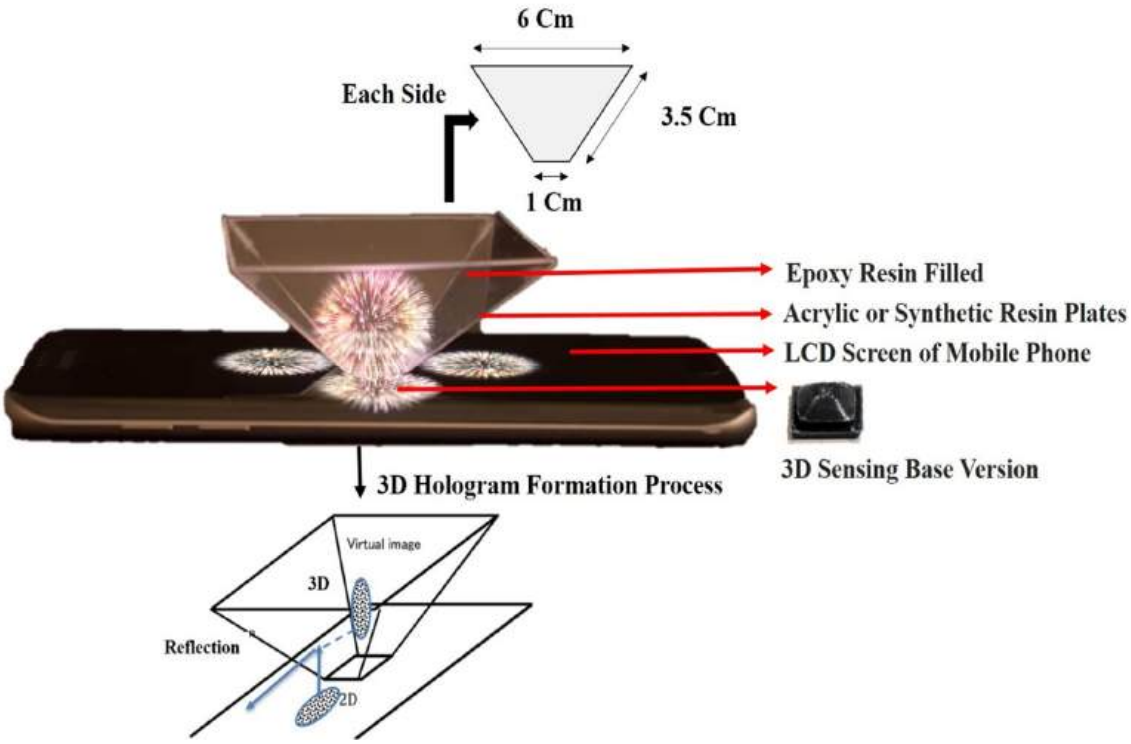


Source: Author's self-construct

Hologram Pyramid on Mobile Screen: It is fastest and cost-effective means. Here a pyramid shaped prism made of acrylic sheet is placed on LCD screen of smartphone. The smartphone projects four pictures upward on each face of the pyramid that are identical but

independent. The combining projection creates the illusion of a 3D picture that levitates in the pyramid. It can only project the display of mobile and lacks in identical multi uses.

Figure-2: 3D Hologram formation on mobile screen



Source: Author's self-construct

Application of Hologram in Army Domain

Reconnaissance Missions: Real-life terrain of area of interest can be recreated or projected by Hologram Technology. Information like topographic features, urban backgrounds and rescue routes through obstacles in holographic maps are vital in reconnaissance operations. It enables operational commanders to visualize situation and plan scheme of manoeuvre or ground operations. The real time imagery keeps all concerns update about latest development. Besides, the 3D projections assist to identify suitable positions of various weapons considering depression and dead ground.

Navigation Systems: 3D holographic view of area of operation can be projected in handheld devices or any goggles which can assist in navigation of any foot patrol. This technology assists soldiers to see through obstructions to navigate risky terrain with greater comfort. Even necessary warnings or critical information can be incorporated there. Again,

navigation data can be displayed in holographic overlay in windshield or special screen of armoured vehicle and soft skinned operational vehicle. Potential hazard or opportunities can be portrayed in the real-time holographic overlay which can assist navigation.

Holographic Sight: Holographic sights are famous for their accuracy, longevity and precision in detecting targets. These sights offer quick target acquisition or aiming even in poor visibility, creating them perfect for competitive shooting. Reducing stress on eye, it provides a larger field of view, precise aiming and faster operation. Avoiding concentration on numerous issues, collateral damages and parallax, it allows user to focus on target only. It uses a laser and mirrors to convey the image through reticle to the shooter's eye. Besides, the heightened imageries allow soldiers to evaluate line-of-sight, grade of ground and dimensions of structures.

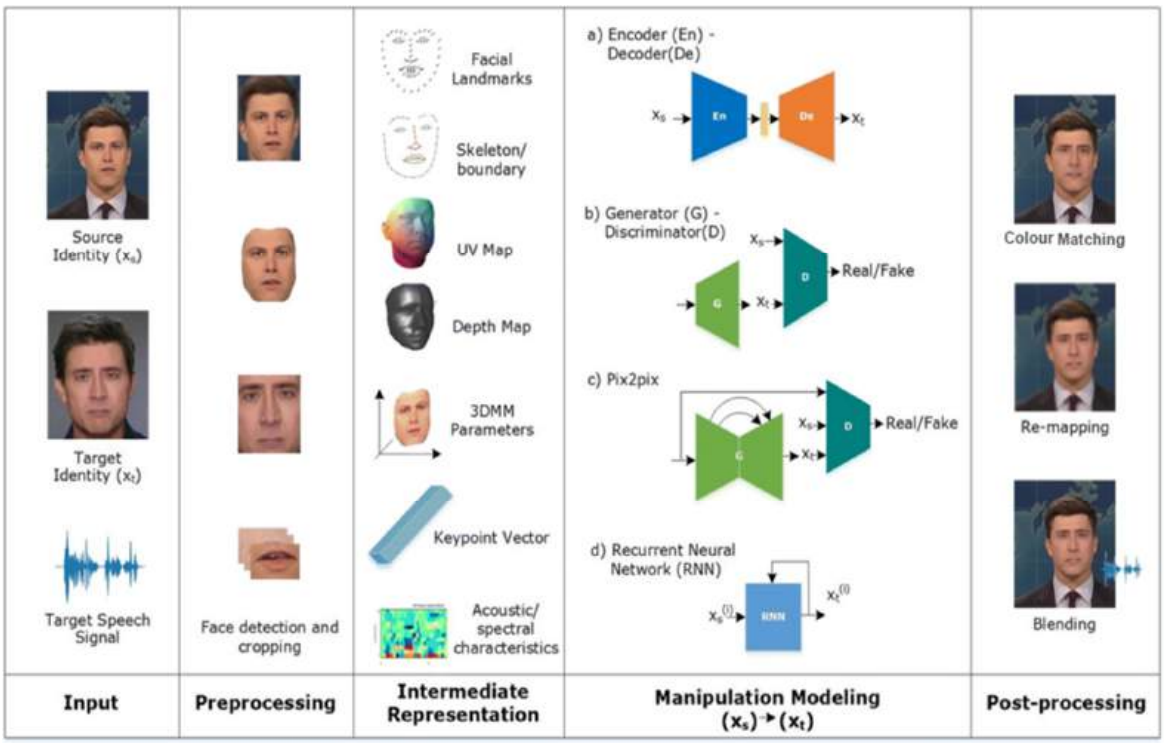
Operational Planning: This technology can simulate real time scenario from urban warfare to large-scale battles. Holographic displays can create highly detailed, precise 3D models of entire area, battlefields or surrounding neighbourhood which keeps commander updated about any development. Military commanders in turn can assess multifaceted scenarios and recognize potential challenges or prospects before arraying forces on the battlefield. Consequently, military leaders can take effective actions to grab success of their campaigns. Moreover, precarious evidence can be offered in a clear, fascinating and natural manner which assists in making quicker and more effective decisions.

Figure-3: Operational planning on holographic projections

Source: Holograms used in the military, available at https://www. reddit.com/r/ Damnthatsinteresting/comments/10g5g8s/holograms_ used_in_the_military/.[3]

Deepfake: It is becoming popular in psychological warfare as it can create or manipulate real scenario and videos by substituting one person's face, voice and gestures by person of interest. Hologram Technology has significantly abridged the process to develop deepfake. With the collaboration of AI, the generated image becomes more realistic. Fake satellite images or other manipulated visual data can be created to spread false information about own troop movements or locations to deceive the enemy.

Figure-4: Deepfakes generating approaches



Source: Momina Masood, 'Deepfakes generation and detection: state-of-the-art, open challenges, countermeasures and way forward', *The ACM Digital Library*, 04 June 2022.

Marketing of Armaments: Depicting product by Hologram Technology to distant customers is effective tool to grasp the attention of them. In armament business also hologram can amplify the 3D image and notable features from all edges. This is convenient for any client to know pros and cons of the product in details. This even assist distant buyers to check accuracy and functioning of component parts.[4]

Deceiving Adversary: In his inimitable military treatise Sun Tzu (544 BC-496BC) mentions "all warfare is based on deception." Holographic images and projections are visible, realistic and can be manipulated. Holography can be used to create an entire army of virtual

soldiers, tanks and other weapons which may appear to the enemy as a formidable force. Depicting a massive military presence to the enemy, the real army members can tactfully bypass conflict zone without engaging in a physical confrontation. The projection becomes highly plausible as portrayed by lasers. Here multiple projectors generate the projection, giving it a 3D appearance, which would work to create an even more formidable force. Hologram soldiers could be used for incursions, raids and to help soldiers retreat during the course of battle, as well as to drive out entrenched enemies. It is cost effective option when a single hologram projector can address the whole issue. However, projection of soldiers, artillery, tanks and fake military bases can confuse enemy intelligence. Campaign planners would be able to use this technology to not only create the illusion of military build-up but also create deterrents for potential conflict. Moreover, innovative Virtual Reality (VR) by hypervision can produce holographic decoys and illusions that can fool and distract foes.

Figure-5: Virtual soldiers by hologram to deceive adversary

Source: Holograms coming to a military theatre near you, available at https://www.afcea.org/signal-media/technology/holograms-coming-military-theater-near-you.

Scalability: Projecting any situation or object in desired scale is another feature of Hologram Technology. An enlarged holographic display of newly developed weapon system can be prepared to see the functioning of various parts. This allows concerns to make desired modifications before preparing a prototype in a cost effective manner. This also eases up troubleshooting and maintenance job.[5]

Training by Simulation: Conventional training techniques frequently lack realism and are unable to accurately simulate the confusion and stress of combat. Hologram gadgets can bring holistic change by incorporating realism in simulation training. With real depictions of entities, settings and situations, army trainees can engage in realistic training exercises. It can enhance skill by negating need for costly devices or armaments. With the use of holographic simulations by hypervision, soldiers can train in an incredibly realistic setting covering hypothetical dangers and tactical manoeuvres. Consequently, it can refine commander's decision-making abilities. Besides, these realistic scenarios offer soldiers priceless experience that boosts their self-assurance and get them ready for any eventuality in the real world. Simulation and virtual training solutions enable ground forces to train in various combat scenarios, enhancing their readiness and operational effectiveness. However, United States (US) Army is using mixed-reality headsets based on Microsoft's Hololens technology which enable soldiers to see where they are and what's around them by projecting holographic images, three-dimensional terrain maps and a compass onto their field of vision.[6] US Marines are also conducting tactical-decision games or simulation-based exercises by this.

Figure-6: An exercise on holographic display

Source: Futuristic warfare strategy, available at https://www.freepik.com/premium-ai-image/futuristic-warfare-strategy-military-intelligence-experts-use-holographic-augmented-reality-table_323732068.htm

Explosives Disposal: The detail 3D images of target area ease up locating hidden explosives or Improvised Explosive Devices (IEDs). The chemical components of explosives can

be identified by sensitive laser rays. The mechanism can also be traced by an enlarged holographic view. These explosives can be disposed by understanding the pattern and construction of that explosive expedient. Again, by giving early warning it can assist to avoid casualty.[7]

Holographic Communication: This method is extremely data hungry. Integrating highly intuitive levels of interaction, holographic field-of-view and resolution can be increased. Again, integrated AI and locational awareness can make it almost impossible to distinguish between virtual and physical reality. Constant holographic monitoring of battlefield will give indications when signals will be blocked or reflected from surfaces. However, transmitted audio with holographic display is also an important means of communication.

Drone Operations: Telemetry data may show the altitude and directional vector of operating drones. Holographic display can assist to analyse drone engagement pattern effectively. Radar intercepted holographic projections can provide a comprehensive, fully digital 3D picture of the sky. Besides, deceptive holographic images also can be projected by drones.

Findings

Market Demand: The global holograms market size was evaluated at USD 44 billion in 2022 and is slated to hit USD 67 billion by the end of 2030.[8]

Strength and Weakness: Few salient issues relevant to army operations are highlighted below:-

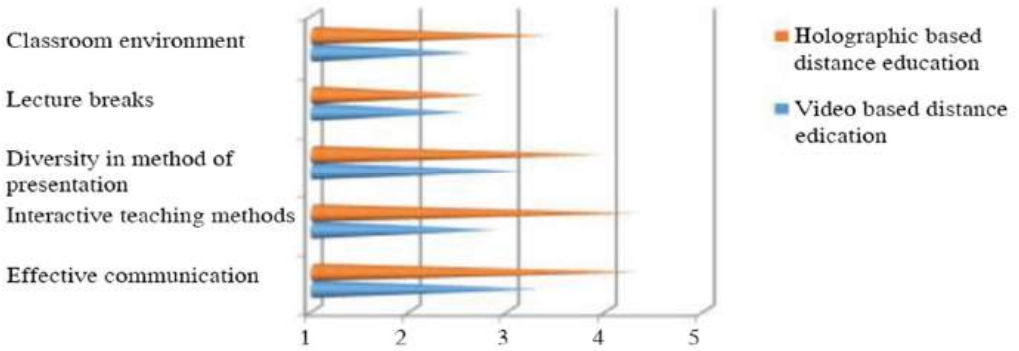
Table-1: Strength and weakness of Hologram Technology relevant to army operations

Strength	Weakness
1. They enable the storing and reproduction of all information carried by light in three dimensions.	1. During fast operation, vibration can obscure parts of a holographically-rendered scene or obliterate it entirely.
2. Holograms are difficult to replicate or counterfeit, making them valuable for security applications such as authentication.	2. Air currents can manifest, distort and affect holographic scene causing difficulty to use.
3. It can store huge data in comparison to storage methods like CDs or DVDs.	3. By nature, it takes time to formulate.
4. Fast projection of 3D real-time issues allows interactions between distant concerns.	4. Limited content availability.
5. It does not require any screen to project which can be viewed from any angle.	5. Huge energy consumption

Source: Author's self-construct

Effective Training Means: Following survey result shows that Hologram Technology is more effective in imparting training than by video-based distance learning.

Figure-7: Comparison between video and hologram based education



Source: Pradeep Kalansooriya, 'Assessing the applicability of 3D Holographic Technology as an enhanced technology for distance learning,'*Researchgate*, August 2015.

Innovative Applications by Various Countries: Few recent innovations are highlighted below:

USA: The Institute for Creative Technologies (ICT) at the University of Southern California, Los Angeles, has used VR characters to trace war fighters in one way or another before, during and after combat deployments.[9] This Institute is even working to initiate holodeck in mind which is bringing imagination to reality by hologram.

China: They invented metasurfaces plate which can identify varying polarization states of light. Analysing characteristics of electromagnetic radiations, it can generate fully independent holographic images. This concept can give dividends to artillery pieces in engaging targets.[10]

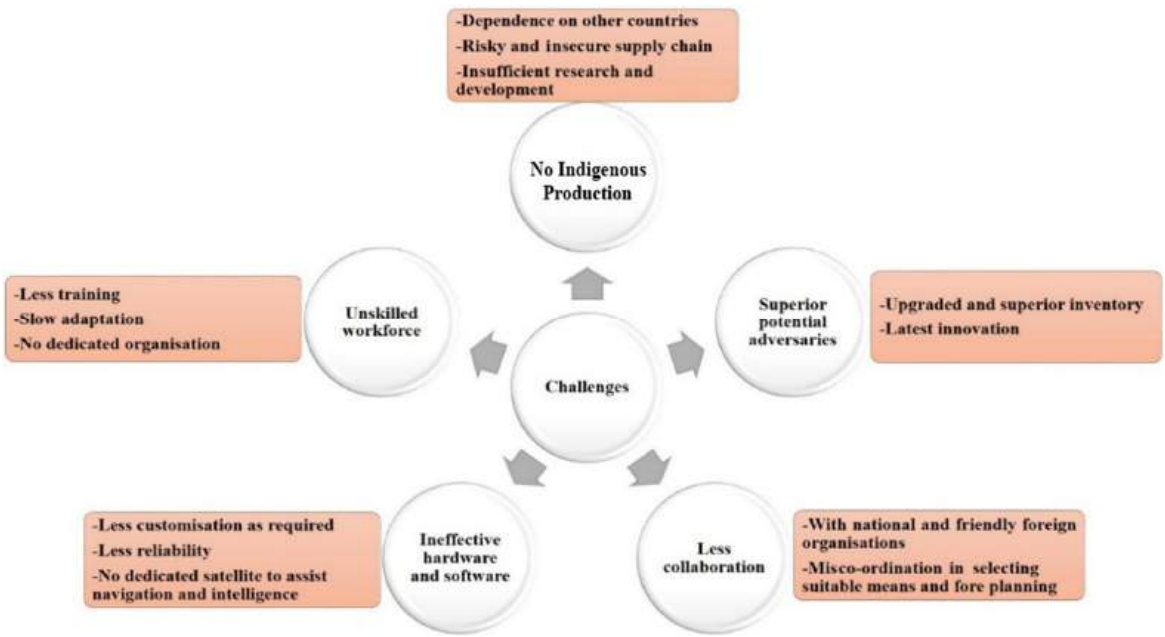
Future Trend: Some upcoming issues are highlighted below:-

- Australian researchers hope to generate lifelike moving holograms that display straight from a smart phone screen.[11]
- Virtually teleporting to a remote location will blur the experience between virtual and physical world.
- Spectators will be able to touch and hear the virtual objects.

- By integrating AI, bionic concepts and voice cloning, Hologram Technology will be able to create digital human models like real ones.
- The features will be easily portable and accessible.
- The AI voice generator technology can imitate any desired sound with projections.
- Security and surveillance of any area can be enhanced by covering that area with holographic beams.

Challenges for Bangladesh Army: Bangladesh Army lags in skill, indigenous production and research in this sector. Still no benchmark have been set to address issues like budget, data security and software development. The primary hurdle is the requirement of updated software, sustainable power coverage and intelligence of area of interest. Bangladesh Army does not have dedicated satellite to collect topographic data and intelligence information on desired area. However, coordination between complex calculations of vast data is also challenging to produce real-time results. Moreover, inventory of armament of potential adversaries are superior to Bangladesh Army. Few other prominent challenges are shown below in Figure 8:-

Figure-8: Challenges for Bangladesh Army



Source: Author's self-construct

Suggested Options for Bangladesh Army

Skill Development: Considering probable enemy threat in an outdoor simulated training should be arranged. 3D models projected by holograms can show landforms, assets and personnel. These assist to generate courses of actions to achieve mission. Even exercise can be conducted on potential battle ground considering real time statistics. This helps in better understanding of plan, decision-making and developing coordination among concerns. The curriculum should also incorporate skill on weapons, addressing IEDs and contingencies. Besides, evaluation after joint training and future advancements in holography can dictate required modifications.

Research and Development: Future battlefield will be more exciting due to blurring the line between virtual and real stakeholders. Research and Development (R&D) will dramatically improve training, design and visualization of the battlefield. Generating heat signatures by innovative applications of laser rays can be a great achievement. It should also incorporate data sharing with other sister services. Required skilled workforce can be outsourced after taking security clearance. Moreover, development of AI holograms can assist tactical visualization in operations and enhance situational awareness.

Deepfake: Innovative application of deepfake is an effective part of propaganda warfare which must be exploited. Telecasting of fabricated messages by influential leaders of adversary force can bring result in own favour. Besides, to counter deepfakes of enemy AI tools can be effective. Moreover, hashtag algorithms, block-chained screening and digital fingerprints can assist to identify deepfake attempt of adversary.

Deception: False target can be portrayed by hologram to deceive the enemy. Innovative application of lasers can falsely attract Infrared Radiation (IR) seeker missiles also. Besides, flares can be fired by lasers from drones to divert enemy attention from main effort.

UN Peacekeeping Operations: Bangladesh is one of the largest contributors to UN peacekeeping missions where also hologram can be used for operation planning, humanitarian intrusion, logistics, resource allotment, critical investigation, situational awareness and security. Use of hologram will confirm a paradigm shift in planning, intelligence, precision and lethality to achieve synergic effect in operations. Even mission planning on holographic projections can blur language and cultural barriers and enhance coordination between forces from diverse countries. Moreover, stakeholders can cooperate seamlessly, share intelligence and conduct joint exercises on holographic models. It can strengthen alliances as a part of diplomatic tool.

Collaboration: Various forces and stakeholders can give input on holographic models. This assist smooth collaboration between sister services, commanders and decision-makers. Real-time data integration and interactive communication facilitates coordination between different platforms to conduct joint operation. It certainly provides synergistic effect.

Disaster Management: Simulated environment can be formulated by hologram considering forecast and dedicated military persons can be trained on disaster management. Hologram also allows to project details of damaged area. This in turn allows to assess damage and need for rescue operation. Rescue teams can reach to assist affected people following holographic navigation. Moreover, coordination between various stakeholders become seamless.

Conclusion

A hologram is a reliable projection showing all the details, features or characteristics of a desired object or place. Following a complicated process combining light, interference and reconstruction, it portrays the real 3D image. 3D holograms are the ultimate cooperation between art and science and a prophetic preview of imaging technology. With incorporation of AI tools the projection become real. It has immense potential in various sector including conventional or non-traditional army operations. Innovation is essential to determine the future of defence operations in the quickly changing field of military technology. However, military strategists are particularly interested in the revolutionary development of holographic display technology. Considering the backdrop of future warfare, it can be applied in deception, realistic training simulations, video conferencing, data storage and operational planning.

Holograms offer the realistic information and cost-effective preparation for a wide array of army missions or countering non-traditional threats. Information like topographic features, urban backgrounds and rescue routes in holographic maps are vital in reconnaissance operation. Real time information can assist patrols or vehicles to navigation to desired destination. However precarious indication can be offered in a clear, fascinating and natural manner which assists in making quicker and more effective decisions by any commander. Deepfake portrayed by hologram is popular in psychological warfare. Moreover, in future digital human models portrayed by holograms integrated with emotion sensing can certainly blur the division between VR and reality.

Bangladesh Army lags in skill, indigenous production and research in this sector. Still no benchmark is set to address issues like budget, data security and research. Considering probable enemy threat, simulated training should be arranged on holograms created 3D models. Deepfake is an effective part of propaganda warfare which must be exploited. False target can be portrayed by hologram to deceive the enemy. Moreover, Bangladesh is one of the largest contributors to UN peacekeeping operations where also hologram can be used for operation planning, humanitarian intrusion, logistics, resource allotment, critical investigation, situational awareness and security. Required skilled workforce can be outsourced after taking security clearance. Finally, efficiency in using and interpreting hologram will certainly give dividends in army operations, training, disaster management and UN mission.

Notes and References

1. Tomoko Sano, *Holography: The Next Disruptive Technology.* Retrieved from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://apps. dtic.mil/sti/tr/pdf/AD1033176.pdf

2. Alex Barnes, 'How Much Do Holograms Cost?' *Luminafans,* February 2024.

3. Holograms used in the military, available athttps://www.reddit.com/r/Damnthatsinteresting/comments/10g5g8s/holograms_used_in_the_military/. Accessed on 11 January 2026.

4. Momina Masood, 'Deepfakes generation and detection: state-of-the-art, open challenges, countermeasures and way forward,' *The ACM Digital Library*, June 2022.

5. Holograms coming to a military theatre near you, available at https://www.afcea.org/signal-media/technology/holograms-coming-military-theater-near-you. Accessed on 11 January 2026.

6. Deborah Bach, 'U.S. Army to use HoloLens technology in high-tech headsets for soldiers,' *Microsoft*, June 2021.

7. Futuristic warfare strategy, available at https://www.freepik.com/premium-ai-image/futuristic-warfare-strategy-military-intelligence-experts-use-holographic-augmented-reality-table_323732068.htm. Accessed on 11 January 2026.

8. Holograms market size, available at https://www. zionmarketresearch.com/report/holograms-market#:~:text=The%20 global%20holograms%20market%20size,14.7%25%20between%202023%20and%202030. Accessed on 12 January 2026.

9. Pradeep Kalansooriya, 'Assessing the applicability of 3D holographic technology as an enhanced technology for distance learning,'*Researchgate*, August 2015.

10. Rajesh Uppal, '3-Dholograms will be employed for battlefield intelligence, military planning and explosives disposal,' *International Defence, Security and Technology*, June 2021.

11. Phil Mercer, 'Why a 'hologram revolution' could be on the way,' *BBC News*, October 2023.

Brief Biography

Colonel Mohammad Mahmudur Rahman Niaz, SGP, psc was commissioned in the Corps of Engineers on 2nd December 1999 with 41 Bangladesh Military Academy (BMA) Long Course. He served in various appointments in four Engineer Battalions, one Independent Engineer Company and two Border Guard Bangladesh (BGB) Battalions. He served as Instructor Class-C in Engineer Centre and School of Military Engineering, Instructor class-B in Non-Commissioned Officers' Academy and Instructor Class-A in Military Institute of Science and Technology (MIST). He also served as Garrison Engineer, Commander Military Engineer Services and Town Planner of Bangladesh University of Professionals (BUP). He commanded a BGB Battalion. Besides mandatory courses, he attended Mid-Career Course at Pakistan. He has completed his Bachelor of Science in Civil Engineering, Masters in Defence Studies (MDS) and Masters in Business Administration (MBA). Presently he is pursuing higher research study program leading to doctoral degree. He has participated in United Nations mission in Darfur and DR Congo. Besides, to his credit he has a number of research articles published in recognized journals. Few of his articles were presented in national and international seminars also. Presently he is serving as Deputy Director General (Works) at Border Guard Bangladesh Headquarters.

A Dignified Second Career of Retired Officers: Requirement Versus Reality

Colonel Mohammad Iftekher Hossain, PBGM, BGOM, psc

Abstract

Officers of Bangladesh Army join the service at a very young age with hope, patriotism and enthusiasm. They dedicate their energy, prime time as youths to protect the sovereignty and independence of the country. Throughout their military career officers are trained in various military subjects essential for their profession. However, such expertise is primarily valuable within the Army and holds less significance in the corporate or civil sectors. As a result, after retirement, many officers face difficulties in building a second career with honour except few special fields. The lack of structured systems to utilize their skills and professionalism often leads to struggles in civil life. Yet, their expertise could significantly contribute to national development initiatives. Challenges such as limited opportunities, lack of awareness and inadequate support systems hinder their transition. To address this, the government and private sectors may create tailored programmes to integrate retired officers into civilian roles. This would not only benefit the nation but also ensure a dignified and respectable livelihood for these dedicated individuals. Developed countries are following various systems to rehabilitate their retired military veterans which can be followed by Bangladesh Government as well. This kind of effort will guard the reputation of the Officers of Bangladesh Army which have been achieved with blood and sweat since 1971.

Keywords*: Retired Army Officer, Military Subjects, Second Career, Government Civil Service, Rehabilitation, Rehabilitation Act, Reputation.*

Introduction

Army officers dedicate their time, energy and life to protect the independence and sovereignty of their motherland. They join the armed forces with patriotism and enthusiasm at a young age. During their training and subsequent service, they are imparted with education and training on various military subjects related to battle, operations and defence strategy. These subjects are crucial throughout their careers as an Army officer. In civilian life after retirement, the importance and application of these subjects are very limited. Retired officers need a fixed income during the later stages of their lives, especially for raising children who are usually studying in college or universities. Despite being physically and mentally capable of continuing to work and demonstrate their competence in various fields, they often encounter numerous problems and challenges to secure respectable livelihoods outside the Army as a retired person. When Army Officers retire, they often face challenges in finding honourable employment or income-generating opportunities in civil life.

The government can play a crucial role to build a second career for retired Army Officers. Establishing a second professional life or career for retired officers is an essential need. The respect and importance given to retired officers will influence new officers joining the forces. Otherwise, if retired officers face hardships and they are forced to take up low-quality second careers, it will undermine Officers' Corps itself. The struggles of retired officers may demoralize serving Army officers. Additionally, intelligence agencies of hostile countries may attempt to weaken the morale of our retired officers through various means which may affect the profession of serving Army personnel. Therefore, it is necessary to protect the officers from such situations. By recognizing the unique needs of retired Army Officers and providing them with the tools and opportunities to succeed in civilian life. Bangladesh Government can ensure that retired officers continue to contribute to the society and they lead dignified lives after their retirement. At present, retired Army Officers are facing multi-dimensional challenges to build dignified second careers which can be solved by taking few steps. These steps will not only benefit the officers and their families but also strengthen the nation by leveraging their skills and leadership in meaningful ways.

This article has been written specifically for retired Army Officers. It analyses the requirement of second career for the retired officers and begins by discussing why it is necessary to rehabilitate retired Army Officers into honourable second careers. Then there is discussion about the types of challenges these officers face in the socio-economic context of Bangladesh while attempting to switch over to such careers. Rehabilitation of retired Army Officers in other countries is also mentioned. Finally, the piece explores what steps the government may take to arrange a dignified livelihood for the retired Army Officers.

Necessity of Rehabilitation of Retired Army Officers

The nation invests a good amount encompassing some decades to create a professional Army officer. On the other hand, the society begins to receive dividends from them after retirement. Army officers are trained in highly specialized fields such as defence strategy, combat operations, military logistics and leadership. A question may arise, why rehabilitation is necessary or if the Army officers are capable, honest and dedicated to their job, they can manage a dignified life by themselves after retirement. The answers to these questions are needed to be understood and necessities of rehabilitation for retired Army officers are discussed in the subsequent paragraphs:-

Military Subjects Versus Requirement of Civil Job: The Officers join the Bangladesh Army with passion and enthusiasm to serve the country at the very young age. All kind of training, study, qualification and efficiency are imparted to them to fulfil the requirement of military service. These military subjects are not highly demanding for civil jobs. Therefore, managing a dignified and standard job becomes a big challenge for a retired military officer. Army Officers go on retirement when their children are

college/university student and retirement from Army is earlier than a civilian government employee. A good number of officers can't manage standard livelihood after retirement due to socio-economic condition and few other factors. In this situation, if necessary measures are not taken for rehabilitation of the retired military officers, serving officers may lose morale also upon seeing the pitiable condition of the retired officers.

Hostile Foreign Intelligence Agency: Any independent country may often face influence or military pressure in various ways from one or more foreign nations. To remain free from various types of external pressures, a country builds its military forces, which work tirelessly to protect the country's sovereignty. In the context of interstate conflicts, Foreign Hostile Intelligence Agencies may work to subdue the country's military officers even after their retirement.[1] Therefore, it is extremely necessary to take proper steps for dignified rehabilitation of the retired officers for following reasons:-

Exploiting Financial Vulnerabilities: Retired officers often face financial challenges after retirement and they struggle to find suitable second careers. Hostile Intelligence Agencies may offer financial incentives or bribes in exchange for sensitive information or cooperation. Foreign Intelligence Agencies may also create fake job opportunities or business proposals to lure retired officers into compromising situations.[2] Retired officers, if compromised may inadvertently provide insights into Army strategies and weaknesses. Hostile Agencies may set up fake rehabilitation or career development programmes for retired officers, using them as a front to gather intelligence or recruit individuals. Retired officers possess valuable knowledge about Army strategies, operations and infrastructure. Hostile Agencies may blackmail or promises of a better life to convince retired officers to share classified information.[3]

Psychological Manipulation: Retired officers may feel neglected or undervalued after leaving active service. Hostile Agencies exploit these feelings of dissatisfaction to manipulate them emotionally. They may use propaganda to create resentment toward the government or armed forces by pushing retired officers to act against national interests. Hostile Agencies may spread false information about retired officers to tarnish their reputation or create mistrust between them and the government or armed forces. This can lead to social isolation and this can also create psychological pressure on them. Hostile Intelligence Agencies may attempt to create divisions within the retired officers' community or between retired officers to weaken the cohesion and morale of the armed forces as a whole.[4]

Socio-Economic Context: Since the independence of Bangladesh, the country has been going through social and political ups and downs and the stability and normalcy of society are not being maintained. Due to the moral, social and political degradation in our

current society, members of the disciplined forces face various problems when they retire. In some cases, they are dishonoured. Therefore, Bangladesh Army needs to take special measures to ensure that retired officers are aware of the issues. In a society where ethical, moral and social degradation exists, if retired members of the Army are unable to maintain the honour of their bloodline, it will lead to a situation where talented young people may not be interested in joining the forces in the future. It is thus vital to make the job market in Bangladesh stable in order to stop political and moral degradation.

Challenges Faced by Retired Army Officers

The second career of a retired Army Officer appears with few challenges and they are to learn to survive without service. Retirement from military services marks a significant transition in the lives of officers. For Army Officers in Bangladesh, this transition often comes with a unique set of challenges and difficulties, particularly in terms of financial stability.[5] These challenges are deeply rooted in the socio-economic structure of the country due to the nature of Army service and the lack of adequate support systems for retired officers. Maximum Army Officers go for retirement in their 50s due to pyramid system of promotion of Army when they are capable and fit to serve the nations. A limited number of retired Army Officers may find employment in a few factories and industries operated by the Bangladesh Army. These opportunities are insufficient compared to the overall demand.[6] Challenges faced by retired Army Officers to build a second career and maintain a reputation are discussed below:-

Limited Job Opportunities: In Bangladesh, the job market is highly competitive and there are limited opportunities for retired Army officers. Many civilian employers do not recognize the value of Army experience, skills and expertise.[7] Army experience could be valuable in field of security management or disaster response. There are often no formal pathways for retired officers to transition into these roles. Moreover, the employment of foreign citizens in the corporate sector and private companies reduced the job opportunities for retired officers. In 2024, there were 10 lakh foreign citizens employed by private companies in Bangladesh.[8] The skills of Army officers are important for national security and Army operations and they often do not align with the requirements of civilian job markets. Civilian employers may not fully understand or appreciate the leadership, discipline and problem-solving skills that Army officers bring to the table.

Limited Savings and Lack of Financial Literacy: Army pensions in Bangladesh are often insufficient to meet the rising cost of living, especially in urban areas. Due to the pyramid structure of service, maximum officers retire in their 50s and their pensions may not be enough to support their families for the next 20-25 years. During their service, Army officers often have limited opportunities to save or invest due to the demanding nature of their jobs and frequent postings in remote areas. As a result, they

may not have substantial savings after retirement. Moreover, Army officers are trained in combat, strategy and leadership, but they often lack financial literacy. Many are unfamiliar with investment options, retirement planning or managing personal expenditure, which can lead to poor financial decisions. Without proper guidance, retired officers may fall prey to scams or risky investments.

Rising Living Cost: The cost of living in Bangladesh has been rapidly increasing, particularly in cities like Dhaka and Chattogram. Expenses related to housing, education, healthcare and daily necessities can quickly outpace the fixed pension income of retired officers. Many retired officers struggle to maintain the same standard of living they enjoyed during their service, leading to financial stress and anxiety. Retired officers often rely on their pension as their primary source of income. Without a dignified second career and additional income streams, they may be vulnerable to economic shocks. Monthly fixed income is highly required to maintain educational expenses of college and university going children of a retired military officer.

Media Propaganda: Adverse Propaganda in some social media against retired Army officers has emerged as a significant concern, often driven by personal vendettas or sensationalism. These campaigns aim to tarnish the reputations of officers who have dedicated their whole service lives to safeguarding the nation.[9] Biased news, misinformation and fabricated narratives at times are spread through social media which leads to public mistrust and unwarranted scrutiny of their service and character. Retired officers, who have often served during critical moments in the country's history, find themselves targeted by allegations, undermining their contributions and legacy.

Rehabilitation of Army Officers in Other Countries

A second career is not a downgrade, rather it is a true recognition of experience. Years of service are converted into mentorship, governance and stability. Uniforms of retired officers are removed, values are not removed. Retirement of Army officers in many other countries around the globe considered as a major transition of an officer's life. Many countries practice dedicated transition and programme for officers prior to their retirement including job placement in state owned enterprises and civilian job networks as well. This situation is discussed briefly below:-

Policy for Retired Army Officers in US Army: In USA leadership quality and management skill of an Army officer is highly valued. A formal programme named Transition Assistance Programme (TAP)[10] is undertaken to prepare on service officers for civilian life well before retirement. This programme focuses on job searching, education, business planning and benefit awareness. The Department of

Veterans Affairs (VA) also offers support for employment, healthcare, education and reintegration of retired personnel[11].

Rehabilitation Programme in Sri Lankan Army: Sri Lankan Army officers are recognized and respected even after their retirement. Usually retired officers serve in government roles, diplomatic posts, public administration or civilian leadership. Military to civilian programme is conducted by The Directorate of Veterans Affairs and Rehabilitation for retired Army officers to train them in financial planning, entrepreneurship and wellbeing.[12] This active recognition and transition support aimed at easing reintegration.

Retirement Support in Pakistan Army: As per the experience of an Army officer, Pakistan employs their retired officers in state agencies, security, training, consulting and public sector leadership. Pakistan Armed Forces have a Veterans Affairs Directorate that helps with pension management, benefit claims, job connections in public and private sectors. Along with pension retired Army officers find employment through networks and government initiatives.[13]

Indian Army: The rehabilitation of retired Indian Army officers is primarily looked after by the Department of Ex-Servicemen Welfare (DESW) under the Ministry of Defence. The operational arm of DESW is Directorate General Resettlement (DGR). Since many Indian Army officers retire in their 50s while still in their prime, the government's policies are specifically designed to bridge the gap between military service and civilian life. This multi-layered support system focuses on three main points: employment assistance, self-employment schemes and comprehensive skill development. The Indian government ensures that the leadership, technical and management expertise acquired during active service is effectively utilized within the civilian sector. Thereby, Indian government ensures the financial and professional future of Indian retired Army officer.[14]

Proposal for Rehabilitation of Retired Army Officer

The integration of retired Army officers into civilian life is not just a matter of social justice but also a strategic imperative for national development. Bangladesh government can unlock a valuable resource by utilising the qualities of retired officer that can drive progress in various sectors. Retired officer can continue to serve the nation in new and meaningful ways. Otherwise, the potentiality and merit of these competent retired officers may be used by other vested groups.[15] Bangladesh Army has already taken few steps to rehabilitate retired Army officers by employing them in various Army-run establishments, organizations and factories with the assistance of Army Welfare Trust (AWT). These employments are not enough since the Army

is expanding and number of retired officers are increasing. The government needs to formulate robust policies, related laws or programmes to assist retired officers in building second careers. Therefore, a strong "Rehabilitation Cell" or "Second Career Cell" is needed for military officers in Army Headquarters by which our disciplined and patriot retired officers can be employed in dignified service, UN job, National and international companies, state run factories, security agencies and in any other government job (with the help of this Rehabilitation cell/Second Career Cell) as per qualification, health and discipline state. To rehabilitate more number of retired officers following are some proposals:-

Establish Dedicated Rehabilitation Cell: A dedicated cell for rehabilitation of retired Army Officers could serve as a one-stop solution for their rehabilitation needs. This cell could offer career counselling and networking opportunities. Establishing a dedicated rehabilitation cell or office within the Army can be a practical solution to address the challenges faced by retired officers in building their second careers. This initiative can serve as a centralized platform to provide comprehensive support, guidance and opportunities for retired military officers. Therefore, Bangladesh Army may establish 'The Retired Army Officers Second Career Cell (RAOSCC)' in the Army HQ which can be highly effective in ensuring honourable and dignified careers for the retired officers. For this, some policies and laws are required for RAOSCC to assist such noble programme.[16]

Proposal to Enact Law for Retired Army Officers Rehabilitation: The enactment of law for rehabilitation of retired officer would transform trained military leaders into a protected and productive national asset. The law obligates the state to secure veterans transitions preventing waste of their skills. To safeguard the retired Army officers and harness their expertise for national development, Bangladesh needs a mandatory rehabilitation related law that legally compels the government to ensure their dignified second careers and post-service welfare.[18] This law may include few key provisions:-

- Inflation-adjusted pension schemes to maintain financial stability.
- Reserved posts and employment in government ministries and defence-sector jobs (like intelligence organization, training, security, defence related posts in ministries and advisory roles) matching skills of retired military officers.
- Counter-espionage protection to deter foreign intelligence traps.

Government Civil Service: Retired Army officers can contribute significantly to national development by joining government bodies and regulatory institutions. They can be employed in key ministries and government departments due to their administrative and strategic expertise. Some of the most suitable career options may be as follows:-

Employment in Government-Run Industries: Retired Army officers can be employed in government-run industries that are currently underperforming or require efficient management and leadership. Government may appoint retired officers as directors, managers, or consultants in State-owned Enterprises (SOEs) such as Bangladesh Steel and Engineering Corporation (BSEC), Bangladesh Chemical Industries Corporation (BCIC) and Bangladesh Sugar and Food Industries Corporation (BSFIC). There are many other government-run industries and sectors that are currently underperforming where retired Army officers can be employed as per the qualification and service background of officers.[17] Employment can be confirmed after required training or courses.

Government Job Reservation: In the charter of duties of various ministries, it is found that many ministries have certain defence-related or relevant responsibilities. To discharge these duties effectively, retired military officers could be appointed on a contractual basis to the respective branches of each ministry. The government could create specialized positions within various ministries and departments for retired Army officers. These positions could leverage their expertise in areas such as defence policy, national security and various regional issues. Retired officers can serve in autonomous bodies, embassies and defence-related posts based on their merits and qualifications.[19] Government may also take steps to appoint retired officers to advisory roles in various government committees and task forces. Their experience and insights could be invaluable in shaping national policies. Retired officers have expertise in security and strategy, logistic and disorder management by serving in various Army installations. They may be allowed to join the intelligence agencies in advisory or operational roles and can thus lead private security organizations that cater to corporate clients and VIP protection.[20]

Collaboration with Private Sector: RAOSCC can work with private companies to create job opportunities for retired Army officers. Agreement can be made with corporations to offer internships and job placements, while also providing leadership training programmes led by retired officers. Retired officers can fill roles in security, logistics and supply chain management, where their skills are highly valuable. Many companies may like to hire the Ex-Army personnel for senior security, crisis response and corporate administrative roles. Additionally, their strong leadership and decision-making abilities make them a great fit for top positions like Directors, CEOs and Consultants. This collaboration may help retired officers find meaningful work while benefiting businesses with their expertise.[21]

Employment in UN and International Collaborations: Retired Bangladeshi Army officers have a proven track record of serving in UN Peacekeeping Missions. The

RAOSCC can facilitate their employment in UN agencies and other international organizations. Retired officers can be re-employed in UN Peacekeeping Missions as Army observers, advisors, or trainers. The government may explore opportunities for retired officers in civilian roles within UN agencies such as UNDP, UNICEF and WFP, where their leadership and organizational skills can be utilized. RAOSCC may coordinate with BIPSOT to provide specialized training and certification programmes to prepare retired officers for UN and international roles, including language training and courses on international humanitarian law.[22]

Establishment of NGOs: Due to service in a disciplined environment, retired officers are uniquely equipped to manage large-scale operations, logistics and human resources with high efficiency. By forming or leading NGOs, they can focus on critical sectors such as disaster response, rural infrastructure development and vocational training. Their expertise in "chain of command" and "Standard Operating Procedures" (SOPs) ensures that social projects are executed with precision, transparency and accountability. Furthermore, their experience in diverse geographical terrains enables them to implement development projects effectively in remote or hard-to-reach areas like Chattogram Hill Tracts. Ultimately, integrating retired officers into the NGO sector not only provides them with a post-retirement purpose but also offers the society a dedicated leadership group capable of driving disciplined and sustainable social change.

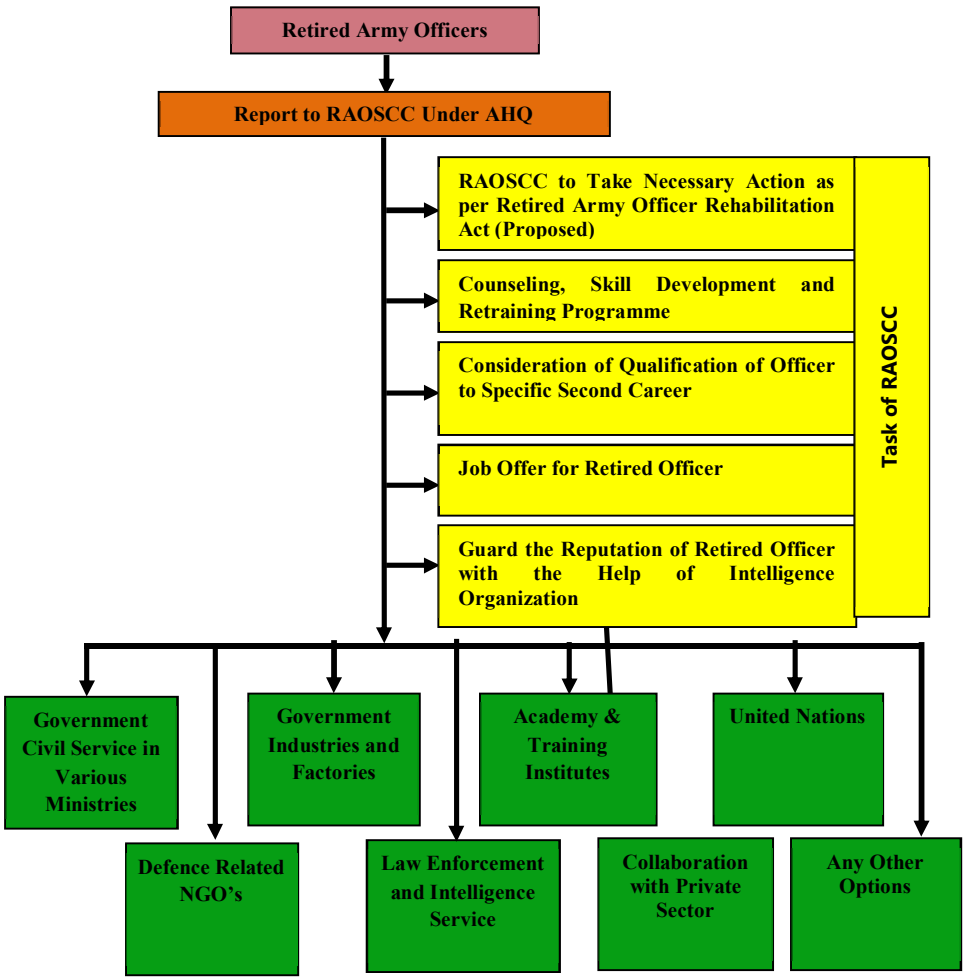
Professional Skill Transition and Training: The hardest transition of retired military officer is not professional but psychological. To help officers adapt their military leadership to the corporate or public sectors, the government may sponsors high-level academic programmes. The Ministry of Defence may subsidize 60% of the course fees and eligible officers may be allowed to enrol during their last year of service or up to 2/3 years after retirement (until age 60). Additionally, officers can pursue specialized certifications in Cyber Security, Corporate Security, Fire Safety, Supply Chain Management and Project Management to facilitate their transition into corporate boardrooms and technical roles. Bangladesh University of Professionals (BUP) can conduct these kinds of training or courses. Military discipline does not expire-it transforms. What once led troops now builds institutions, companies, classrooms and communities. Many retired officers choose to work in teaching and training after their retirement. They may get jobs at universities and defence colleges, where they can teach important subjects like strategic studies, peace and conflict studies, defence management and leadership skills. Their real-world experience makes their lessons very valuable for students.[23]

Employment Assistance and Institutional Support: The RAOSCC may act as a vital bridge between retired officers and the job market through various institutional mechanisms. One of the most prominent options is the Security Agency Scheme, where retired officers may register and they may run their own private security agencies. Furthermore, the government may facilitate Corporate Tie-ups and Job Fairs in collaboration with industrial bodies connecting veterans with multinational companies for roles in security. For public sector careers, retired officers may be allowed for lateral entry and in specific security related post of Civil Services and various state-level confidential posts through age relaxations.

Entrepreneurship and Self-Employment Schemes: For officers seeking to start their own businesses, the Ministry of Defence can provide preferential allotment and licensing in several lucrative sectors. These may include the Management of Retail Outlets for oil companies as well as the management of CNG stations through Bangladesh Energy Regulatory Commission (BERC). Retired military officers may be allowed to form companies in the energy sector and transportation scheme. An amount of 8-10% of LPG distributorships can be reserved for retired army officers by the government.

Guard Reputation of Officer: The issue of reputation damage acts as an obstacle in building an honourable career for retired Army officers. The Army officers go on retirement but leadership expertise remain. In a second career, respect is earned by character, not insignia. Reputation is so significant that it is said "Guard your reputation with your life.''[24] Hostile agencies may uses honey traps, emotional traps, frame-up trap, scandal trap, false hag trap and blackmail traps to tarnish the reputation of Army officers.[25] To keep retired officers' reputation safe RAOSCC may arrange workshop to teach retired officer how to recognize spy tricks. This means showing them how spies might try to fool them by offering fake jobs, pretending to be friendly or trying to get close just to steal secrets. This can be done this through easy-to-understand training sessions and workshops under RAOSCC. If retired officers get better pensions, skill training and respectful jobs, they will not to adopt those unfair steps. Vested groups usually try to take advantage of people who feel lonely or are struggling financially. Removing these weaknesses can make it much harder for the enemies. This kind of effort by RAOSCC will guard the reputation of the Officers which have been achieved with blood and sweat since 1971. Otherwise, the rank and dignity of these officers may be abused in civil arena.

Figure-1: A Suggested Chart for Retired Army Officers Rehabilitation



Source: Author's self-construct

Conclusion

An oft-repeated maxim in the military runs, "Retirement from uniform is not retirement from duty. A soldier's sense of responsibility does not end with service; it simply finds a new field." The Army officers of Bangladesh dedicate their lives to the service of the nation and it is the responsibility of the government to ensure that they can lead dignified lives after retirement. Retired officers possess immense potential to contribute to society in various professional fields with extensive leadership experience, strategic thinking and strong ethical values. The socio-economic conditions of Bangladesh often do not provide adequate opportunities for retired Army officers to secure dignified and respected employment in civil, corporate or business sectors. Therefore, rehabilitation for a retired Army officer is highly necessary.

The difficulties faced by retired Army Officers in building second careers are rooted in a complex interplay of systemic, societal and personal factors. These include the mismatch between Army and civilian skills, lack of networking opportunities, limited job opportunities, financial constraints, inadequate government support, societal perceptions and family responsibilities. By providing career opportunities in various sectors of government can ensure that these national heroes lead a dignified and honourable post-retirement lives. Proper career transition support not only benefits the officers and their families but also contributes to national progress by utilizing their skills for the greater good. Developed counties are following various systems to rehabilitate their retired military veterans which can be followed by Bangladesh government.

The government can help retired officers transition smoothly to civilian life and contribute to the socio-economic development of the country by establishing a comprehensive framework for their rehabilitation and second career placement. Retired Army officers possess valuable skills, experience and leadership qualities that can be leveraged in various sectors, including government-run industries, international organizations, entrepreneurship and the private sector. RAOSCC can collaborate with UN, government agencies, private sector organizations and international bodies to identify job opportunities for retired officers. By taking these measures, the dignity and integrity of retired armed forces officers can be preserved which in turn can ensure that their sacrifices and contributions are not overshadowed by baseless propaganda.

Notes and References

1. S. Carl Savino and Ronald L. Krannich, *The Military to Civilian Transition Guide*, Impact Publications, August 2011.

2. John Gaona, *The Civilian Job Market After Army Service*, US Army 19 November 2024.

3. Navigating the Military Transition: available at www.military-transition.org.

4. *Military Transition Handbook* available at www.military-transition.org.

5. Mishra Virendra Kumar, 'Study of Challenges Encountered by Indian Military Veteran Entrepreneurs during their Entrepreneurial Journey', *JETIR*, Volume-8, Issue-5, May 2021.

6. Jayadevi Vivekanand, 'A Study on Indian Veteran's Career Transition National Building Resource,' *Empirical Economics Letters*, 20 (Special Issue), April 2021.

7. Molak R. Sharma, *Transition from Military to Civilian Society: Trials and Tribulations of Integration process*, SAGE, 2021.

8. 'Hostile Foreign Intelligence Agency', available at https://www.thedailystar.net/bytes/wikileaks-hostile-intelligence-service-cia-chief-1392355. (Accessed on: 17 April 2017).

9. Ishtiak Ahamed Taher, SHRM, SCP. `Transition from a Army to civil career', available at https://worksmartbd.com/2021/10/13/transition-from-a-military-to-civil-career-a-corporate-perspective/. (Accessed on: 13 october 2021).

10. 'John Gaona, the Civilian Job Market After Army Service', available at https://www.fromboots2 suits.com/post/navigating-the-civilian-job-market-after-military-service.(Accessed on: 19 November24.

11. Available at https://erica.ceo/navigating-the-transition-addressing-the-challenges-veterans-face-in-the-civilian-workforce, (Accessed on: 05 May 2024).

12. *Prothomalo* news and *Desh Rupantor* news available at https://www.prothomalo.com/ bangladesh/szyxvpk6jm. https://www.deshrupantor.com/512538/. (Accessed on: 28 May 2024).

13. bdnews24.coim available at https://bangla.bdnews24.com/bangladesh/73976e1f12c5?utm. (Accessed on: March 2022). (Accessed on: 30 October 2024).

14. Human Rights, retrieved from google chrome extension available at https://www.hrw.org/ news/2020/08/12/bangladesh-police-kill-retired-army-officer. (Accessed on: 12 August 2020).

15. https://bangla.bdnews24.com/bangladesh/73976e1f12c5?utm.

16. Available at https://www.tbsnews.net/bangladesh/false-propaganda-targeting-bangladesh-army-spread-various-foreign-media-social-media-ispr?utm. (Accessed on: 28 July 2024).

17. 'Transition Assistance Programme (TAP) Led by U.S. Department of Defence', available at https://www.dod tap.mil/dodtap/app/home.

18. 'Jobs for Veterans and transitioning military', available at https:// vacareers.va.gov/career/ guidance/veterans-and-transitioning-military.

19. 'Directorate of veterans Affairs & Rehabilitation Conducts Military to civilian (M2C) Programme', available at https://www.army.lk/news/directorate-veterans-affairs-rehabilitation-conducts-military-civilian-m2c-programme-non.

20. 'Functions of Pakistan Armed Service Board', available at https://pasb.mod.gov.pk/Detail.

21. Available at https://dgrindia.gov.in/Content2/about-us/about-dgr?utm.

22. VidmantasTutlys and Jonathan Winterton, 'Integrating retired Army officers into the civilian labour market,' *European Journal of Training and*, Development 42(4)', available at https://www.researchgate.net/publication/327218502_Integrating_retired_military_officers_into_the_civilian_labour_market_A_competence-based_approach. (Accessed on: August 2018).

23. 'U.S. Department of Veterans Affairs, provides lifetime healthcare', education benefits (Post-9/11 GI Bill®) and home loans, available at https://www.va.gov/.

24. 'Department of Ex-Servicemen Welfare', available at https://desw.gov.in/.

25. 'Veterans have a platter full of career choices', available at https://www.tribuneindia.com/news/archive/jobs-careers/veterans-have-a-platter-full-of-career-choices-658632/. (Accessed on: 26 September 2018).

Brief Biography

Colonel Mohammad Iftekher Hossain, PBGM, BGOM, psc was commissioned on 7th June 2000 with 42nd Bangladesh Military Academy (BMA) Long Course in the Corps of Infantry. He is a graduate from Defence Services Command and Staff College (DSCSC), Mirpur. Besides the mandatory military courses, he completed Advanced Course on Administration and Development from Bangladesh Public Administration Training Centre (BPATC), Savar. He has completed UN Peacekeeping Mission in Democratic Republic of Congo and in Operation Kuwait Punorgothon (OKP-7), Kuwait. The officer served in an Infantry Regiment as Adjutant, in Bangladesh Military Academy as Assistant Weapon Training Officer (AWTO) and as Commanding Officer (CO) of a Border Guard Bangladesh (BGB) Battalion. The officer served in Headquarters BGB, Peelkhana, Dhaka as Director Administration and as Sector Commander of BGB, Rangamati. At present he is serving at BGB Sector Kushtia as Sector Commander.

The Equilibrium of Excellence: Decoding the Paradox in Soldier Profiles Reconciling Disciplinary Records with Heroic Efficacy in the Context of Bangladesh Army

Lieutenant Colonel Syed Fazle Muneem, Ordnance

Abstract

This article examines the ''imperfect hero'' paradox in Bangladesh Army: the alternatively high level of combat efficacious behaviour and the repeated deviance of discipline among high-performing soldiers. In line with Huntington's theory of objective control, while the ingrained dictates of doctrinal norms which require absolute obedience, the sets of operational realities often give precedence to results over regulation specially in case of supporting a counter insurgency and UN peacekeeping operation. Using Smith and Lewis's Organizational Paradox Theory, this study examines how ''maverick'' soldiers exploit their tactical indispensable to garner ''idiosyncrasy credits,'' in which they literally buy their immunity from normal disciplinary measures. The study has uncovered a duplicitous system of justice in which there is a formal ''zero-tolerance'' track for the rank-and-file and an informal ''shadow tolerance'' for high-performers. This ''Competence-Compliance Trade-off'' hints that the psychological traits that lead to being a hero - aggression, risk-taking and autonomy - are antithetical to garrison regimentation. Consequently, the study advocates the need for military leadership to move away from bipolar enforcement leadership toward a ''Dynamic Disciplinary Model.'' The conclusion is that the ''equilibrium of excellence'' does not lie in the elimination of deviance, but in its strategic management, avoiding the normalization of indiscipline and leaving the military initiative of death necessary for winning.

Keywords*: Military Discipline, Heroic Efficacy, Organizational Paradox, Leadership Ethics, High-Performance Deviance, Moral Licensing, Idiosyncrasy Credit.*

Introduction

The military institution is uniquely characterized by a fundamental duality between the functional need to conduct wars successfully and the normative need for members to be absolutely obedient. This tension between ''bureaucratic rigidity'' and ''operational fluidity'' has remained a key debate in military sociology for a long time. Samuel Huntingon (1927-2008), in his formidable work *The Soldier and the State*, held that the strict adherence to professional code (which is same as discipline) is the foundation stone of military effectiveness.[1] However, the chaotic reality of modern warfare often requires a different set of virtues: the exercise of initiative, improvidence and aggressive autonomy. In the case of Bangladesh Army, an institution with a very rich history developed in the Liberation War of 1971 and honed over the past few

decades as peacekeepers in many countries, the dynamic is especially acute. Bangladesh Army operates within a framework that values the regimentation of its colonial heritage. The question then remains whether strict garrison discipline is always equivalent to superiority in battle, or if it does not, then are the heroic efficacy emphasized?

This article examines a soldier type that has been neglected in scholarship but is very common: the "imperfect hero.''[2] These have been individuals who have consistently been above par in their display of combat acumen, tactical innovation and physical courage, all of which have been collectively labeled as "heroic efficacy;'' but about whom have generally been caught in the strict codes of discipline that prevailed in peacetime cantonment life. This phenomenon is an example of a classic organizational paradox. While there is an official institutional requirement to implement a "zero-tolerance" policy for deviance, in reality the operational environment often forces commanders to tolerate and even protect high-performing rule breakers. These soldiers live in a gray area where they provide "equilibrium of excellence" in which their operational value seems to outweigh their disciplinary liability.

The central focus of this article is to break down the "competence-compliance trade-off" within Bangladesh Army. It attempts to address some fundamental questions: First, how do the combatants compromise the paradox of maintaining soldiers whose efficacy is high, but who have poor disciplinary records? Second, what are the institutional implications of having this 'shadow tolerance' for the broader culture of military discipline and ethics?

Military Discipline: Normative and Functional Perspectives

To deconstruct the "imperfect hero" this study combines military sociology, organizational paradox theory and behavioural psychology. This framework surpasses a functional byproduct of the tension between the sanction of normative discipline (avoidance) and functional necessity.

Table-1: Normative vs Functional Discipline

Dimension	Normative Discipline	Functional Discipline
Purpose	Rule compliance	Operational effectiveness
Enforcement	Rigid	Adaptive
Decision latitude	Minimal	High
Operational suitability	Low in combat	High in combat

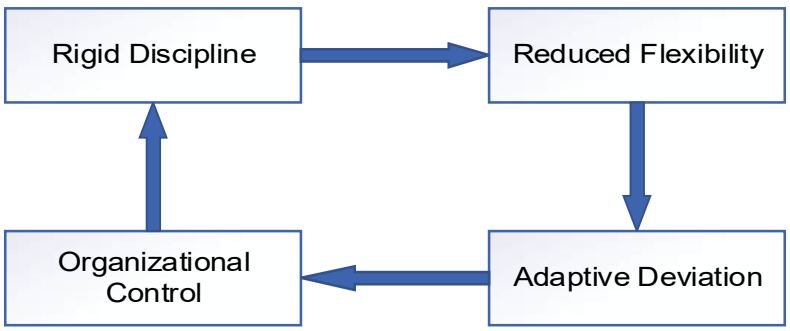
Source: Author's self-construct

The "Normative View" states that violence management involves absolute hierarchy where obedience is the most important virtue for guaranteeing the monopoly of force for the state.[3] Conversely, the "Functional View" believes that modern irregular warfare calls for a

"constabulary" force that can make independent judgment. This creates a point of friction: on one hand the soldier who makes a change in protocol to gain a tactical advantage violates the normative standard to serve the functional goal.[4]

Organizational Paradox Theory

Diagram-1: Discipline–Performance Paradox Loop



Source: Author's self-construct

Smith and Lewis defined organizational paradox as contradictory aspects that do not go away for a long time. For military, the paradox is that of the need for stability (hierarchy) together with flexibility (initiative).[5] It is this "imperfect hero" who represents this "performing-organizing" tension. Leaders who seek to "solve" this through requiring complete compliance risk extinguishing initiative; leaders who neglect discipline risk seeing decay. The occupation goal is "dynamic equilibrium." [6]

Moral Licensing and Deviance

Table-2: Moral Credit Accumulation Model

Performance Level	Moral Credit	Rule Flexibility
Low	None	Zero tolerance
Medium	Limited	Conditional
High	High	High
Exceptional	Very High	Strategic tolerance

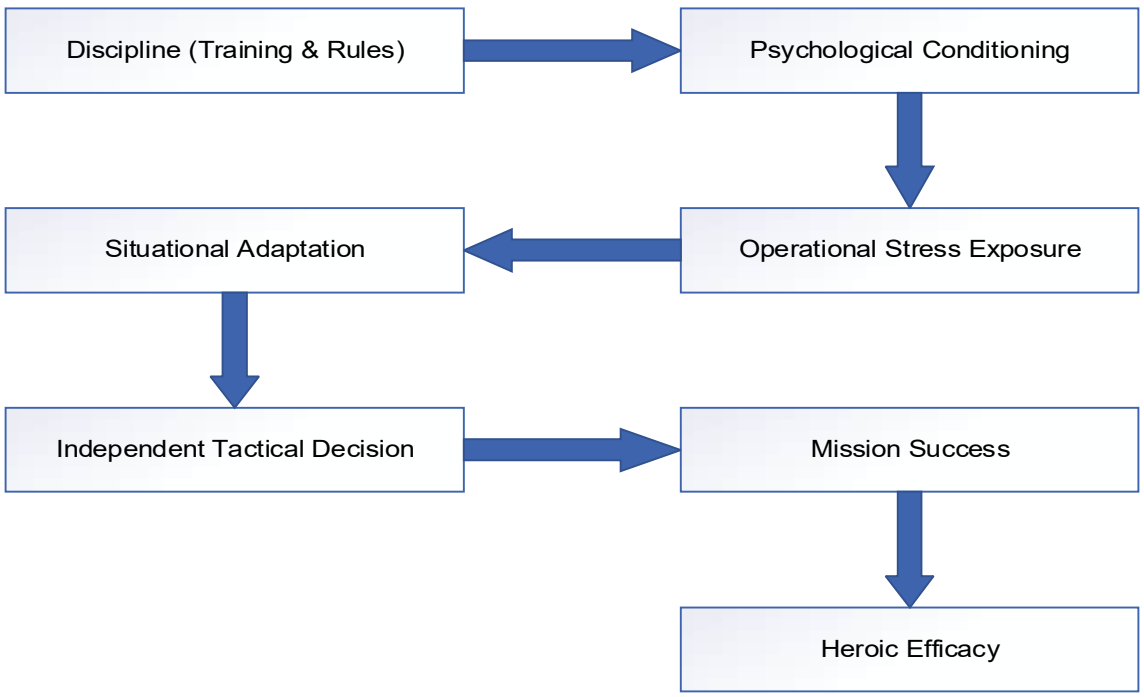
Source: Author's self-construct

Psychologically, "Moral Licensing Theory" implies that people who develop a strong morality self-image, through acts of bravery, give themselves a "license" to violate norms subconsciously.[7] A soldier with a distinguished combat record might insubordinate the

restrictions of administration like trivial "taxes" that the organization owes to them. This creates a self-reinforcing cycle in which we get away with a lot of non-compliance because performances are high.[8]

Integrative Conceptual Model (Suggested)

Diagram-2: Soldier Excellence Equilibrium Model



Source: Author's self-construct

This model proposes a "Dynamic Disciplinary Model," which assumes that leadership works on a matrix of "Operational Value" versus "Regulatory Cost." As the operational value goes up the institution's tolerance for deviation expands, forming a distinct category for the "Imperfect Hero" (Low Compliance/High Efficacy).[9]

Empirical and Institutional Context: Bangladesh Army

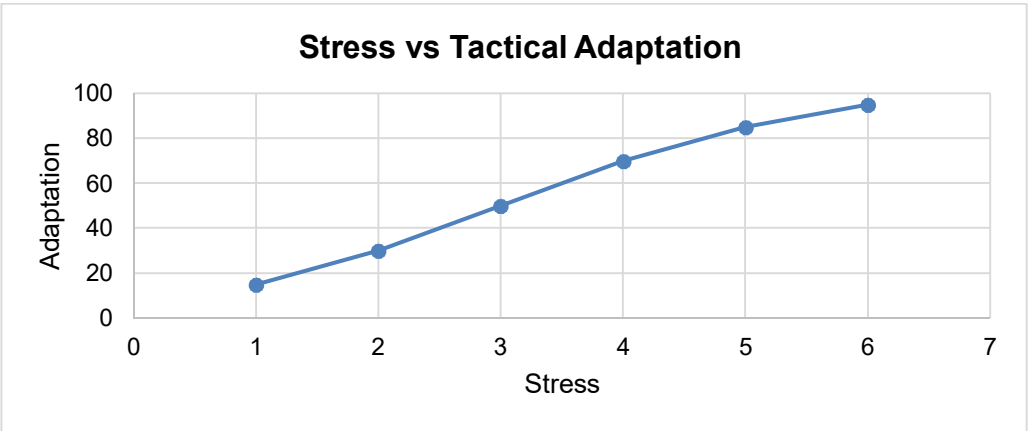
In order to understand the paradox of the "imperfect hero" in Bangladesh Army it is necessary to focus on the peculiar international historical and operational landscape of the institution. It is an organization with a heritage of its colonial predecessor and the revolutionary fluidity of its birth during the 1971 War of Liberation. The disciplinary backbone of Bangladesh Army is based legally on the Army Act, which is based heavily on the British

Indian Army Act of 1911.[10] This framework was intended to be for a colonial constabulary force with an emphasis on absolute hierarchy, unquestioning obedience and a clear division between the officer class and the soldiery.[11]

However, the spiritual origin of the institution is in the War of Liberation of 1971 - a war fought, to a large extent by guerrilla warfare. This was a momentous foundation, creating a countering ethos; the importance of improvisation, resourcefulness and decentralized initiative generally substituting bureaucratic procedure.[12] As a result, the modern disciplinary framework is under a state of tension. While the written code (the Army Act) calls for the rigidity of the 19th century regiment, the unwritten institutional memory fetishizes the "maverick" spirit of the Freedom Fighter who breaks rules to win the war. The "imperfect hero" is in many ways an expression of this unresolved historical identification.[13]

Operational Demands and Combat Ethos

Graph-1: Operational Stress vs Tactical Adaptation



Source: Author's self-construct

The case of Bangladesh Army operational tempo has greatly changed over the past three decades from traditional postures for defence operation to prolonged engagement in asymmetric warfare mainly Counter-Insurgency Operations (CIO) in Chittagong Hill Tracts to UN Peacekeeping operation worldwide. These at times and places force a premium on the "Strategic Corporal," junior leaders who must make high-stakes diplomatic and tactical decisions in rather remote locations, oftentimes without officer supervision at hand.[14] In the turbulent nature of the Democratic Republic of Congo or South Sudan, a soldier's worth is assessed based upon his capacity to move through chaos, control aggression and secure the perimeter - all features consistent with heroic efficacy. In such a high-stress theatre, "garrison discipline" (uniform precision or rigid punctuality for one), "tactical discipline" (fire control and combat awareness)

naturally falls to second place in operational importance and the operational justification for allowing minor deviations is found.[15]

Leadership Culture and Performance Expectations

Table-3: Leadership Style vs Performance

Leadership Type	Discipline Mode	Combat Output
Authoritarian	Rigid	Moderate
Transactional	Controlled	High
Transformational	Adaptive	Very High
Mission Command	Dynamic	Exceptional

Source: Author's self-construct

The leadership culture in Bangladesh Army can never be denied to be performance-oriented. While the institution publicly espouses a "Zero Tolerance" policy for dealing with discipline, professional competence and operational success are highly weighted in the internal appraisal systems (e.g. the Annual Confidential Report).[16] Commanders are under tremendous pressure to get results - whether that be in disaster management, infrastructure projects or security operations. This establishes a "pragmatic loop:" this is the cycle in which a commander is incentivized to protect a high performing soldier who has some disciplinary baggage because the loss of this soldier would degrade the unit's level of operational readiness. Thus, the culture is an outgrowth of the unstated practice that although discipline is the norm, performance is the currency.[17]

Institutional Handling of Disciplinary Deviations

Institutionally, the process of dealing with high performance deviants can often occur in informal channels. Rather than immediate court-martial or summary disposal, which results in a permanent black mark cast, commandos often make use of "extra-judicial" corrective measures for their choice soldiers.[18] This could include severe oral reprimands, extra duties of an informal nature or loss of privileges for a short time, but not the revocation of privileges or charges. This "shadow justice" system helps the institution to correct the behaviour without destroying the career of a valuable asset. However, this discretionary leniency is only rarely codified and as a result there is an inconsistent application of justice whereby the "imperfect hero" survives infractions that would see a mediocre soldier shoved out on the street.[19]

Comparative Insight (Regional/Global Parallels)

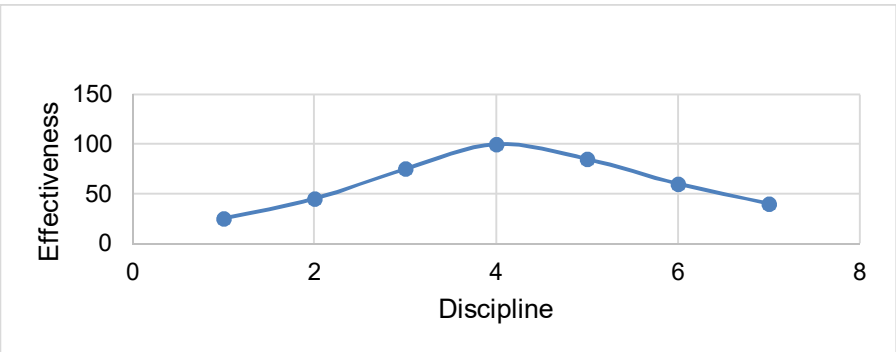
Such a phenomenon is not exclusive to Bangladesh but is enhanced by its unique regional situation. Compared to armies in western countries, where the "strategic corporal" concept is formalized in doctrine, the South Asian armies often have a steeper hierarchy. Yet, parallel dynamics are seen in elite units anywhere in the world like the special forces of the Indian Army or in the British Army where there is a distinct "sub-culture" of a laissez-faire of discipline.[20] The case of Bangladesh Army is unique as this paradox is not limited to elite units, but is spread to regular infantry battalions due to the universality of UN based missions resulting in a normalization of a level of autonomy that is normally reserved for Special Forces.[21]

Standards of Discipline Infractions among High Performers

The summation of the doctrinal anticipation of expectations and the realities of operations on the field of games forms a complex typology of the "imperfect hero." It is visible that disciplinary adherence and heroic efficacy in Bangladesh Army are negatively correlated in particular high-performance situations. Analysis shows that in a special pattern of infractions committed by high-efficacy soldiers. These people never tend to indulge in "predatory deviance" (theft or treason) which leads to immediate expulsion. Instead their infractions are in the main "autonomy crimes," uniform violations, unauthorized kit modifications and constructive insubordination where orders are altered to with superior tactical outcomes.[22] In the case of Bangladesh Army, these acts are semiotic signs. The soldier exhibits a prioritization of the substantive mission (combat readiness) over the symbolic mission and the thrust of bureaucratic rules is seen by him as friction which hinders their primary task of being warriors.[23]

Correlation in Heroic Efficacy and Rule Deviation

Graph-2: Discipline vs Battlefield Effectiveness (Inverted U Curve)



Source: Author's self-construct

The graph describes a "Competence-Compliance Trade-off." The psychological characteristics that lead to heroic efficacy, which include high testosterone, fast cognitive processing and risk-tolerance are sociologically consistent with non-conformity.[24] A soldier wired to charge a machine-gun post in the Chattogram Hill Tracts, on the other hand, is statistically less likely to have the docile temperament needed for perfect garrison discipline. "Heroic efficacy" requires cognitive flexibility which is antithetical to the requirements of rigid procedural compliance; however, the very qualities which make them assets in war are their liabilities in peace.

Leadership Tolerance Thresholds the "Credit System"

A very important finding would be an existence of an informal "Operational Credit System."[25] In this unspoken economy, acts of valor allow "credits" to be generated by soldiers, which they "spend" in order to lessen the disciplinary penalties. This is justified in the minds of commanders by utilitarian thinking: just too costly to enforce strict discipline and lose the possible loss of operational capability? This constitutes creating a "protected class" of the unit. While official doctrine accounts for treating all equally, in reality, justice is scored in terms of grading on a curve of utility – "The Imperfect Hero is insulated by their indispensability."[26]

Institutional Trade-Offs

This "shadow tolerance" has devastating institutional costs, namely the diminution of perceived fairness. "Average" soldiers reliable but not tactically brilliant often see leniency of this kind to high-performers as favoritism and the result is "Disenchanted Compliance." Furthermore, enshrining the exempting of elites from abiding by Standard Operating Procedures (SOPs) undermines the authority of the SOP in the first place.[27]

Table-4: Trade-Off Matrix

Control	Flexibility	Operational Outcome
High	Low	Predictability
Balanced	Balanced	Excellence
Low	High	Chaos

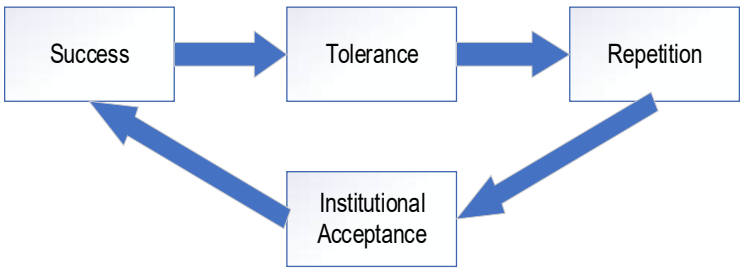
Source: Author's self-construct

Normalization of Deviance

The final threat is the "Normalization of Deviance." If the "imperfect hero" is rewarded on a consistent basis in spite of infractions, deviant behaviour becomes culturally codified as a hallmark of "real soldiering."[15] Junior soldiers can imitate the insubordination, rather than the competence and be faced with a toxic sub-culture where discipline is seen as a crutch for the

weak. The paradox is only stable if it is rare; if "imperfect heroism" is taken out of the rare category of being an exception and becomes the standard model, then a destabilization of the chain of command is threatened.[28]

Diagram-3: Deviance Normalization Cycle



Source: Author's self-construct

Controlled Flexibility vs Moral Hazard

While the "Credit System" (where heroism buys leniency) maintains the talent, an important moral hazard is introduced. By allowing high-performers to operate outside the normal regulatory structure, commanders risk giving the wrong message that rules are mere suggestions to the talented. This fits the "Dark Side of Organizational Paradox," where the exemption of elites brings the cynicism of the masses. If a heroic soldier is permitted to be habitually late or untidy, it demoralizes the average soldier who depends on adherence to rules for his or her professional self-worth.

Lessons of the Best Military Units in the World

At the market level, this paradox is commonly solved by segregation, around the world. Western militaries (e.g., US Special Forces, British SAS) institutionalize this deviance by having separate units with relaxed standards of grooming and deportment.[16] In these "tier-one" environments, the "imperfect hero" is the norm and not the exception. Bangladesh Army is in a unique situation, because these types of personalities are often found into the regular battalions. Without the structural segregation of a "special forces" environment, the tension between the "maverick" and the "conscript" goes on unresolved, creating friction in the barracks that does not exist in the segregated models of Western armies.[29]

Implications for Command Philosophy

The continuance of the "imperfect hero" implies the demand for a change of command philosophy from "Coercive Compliance" to "Calculated Management." The effective commander in Bangladesh Army is not necessarily the one who enforces the Army Act to the letter, but the

one who is able to distinguish between "malignant deviance" (which rots the unit) and "benign deviance" (which is a sign of a high autonomy).[17] Reconciling the paradox is then just getting to terms with the fact that there does need to be some sacrifice of security in terms of things like a messy barracks at times.

Policy Implications

The development of identification of the "imperfect hero" paradox is the imposition of a change from a passive observation to an active institutional management. If Bangladesh Army is to uphold its "equilibrium of excellence," it is necessary that it develops its human resource framework to accommodate the high-performance deviant without compromising the integrity of force. Currently, the leniency that is extended to high-performers is informal and discretionary, leading to inconsistency. Army may consider amending the Manual of Military Law to formally recognize "Proven Operational Merit" as one of the mitigating factors of non-criminal disciplinary hearings. By codifying this, the institution brings the "shadow justice" into the light, which ensures that leniency is used transparently and is only applied for genuine operational value, rather than personal partiality.[30]

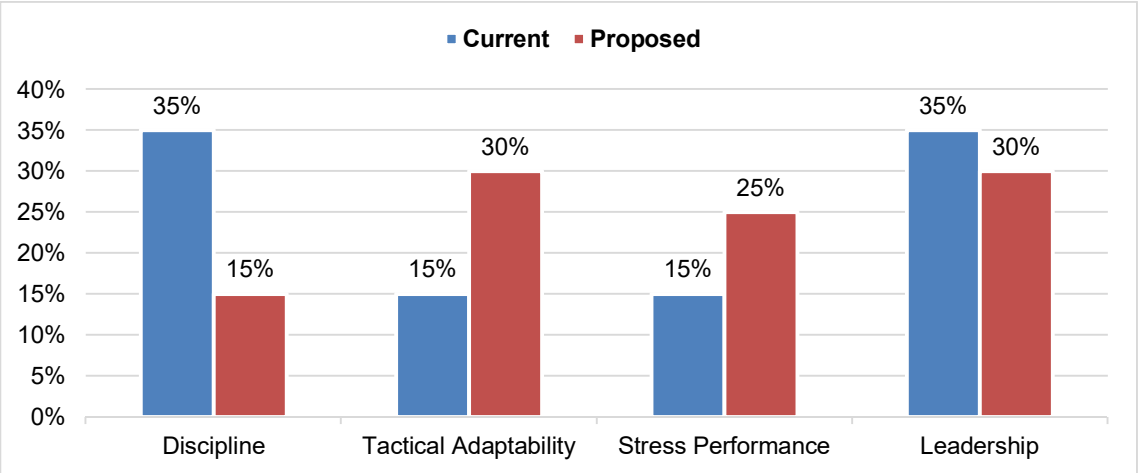
Adjustments to Leadership Training

The curriculum of Bangladesh Military Academy (BMA) is expected to go beyond the choice of "Command and Control" to that of "Talent Management in Asymmetric Contexts." Junior officers need to be trained to differentiate between corrosive indiscipline (which is a challenge to authority) and creative autonomy (which is a challenge to process). Case studies of historical "mavericks" who succeeded need to be taught alongside the standard regulatory texts and they should provide future leaders with the cognitive tools to deal with high maintenance and high output soldiers.[31]

Performance Evaluation Reforms

The Annual Confidential Report (ACR) system is the main engine of career progression and under this system marks are usually deducted more in disciplinary ground than rewarded for innovation. A reformed "Weighted Scorecard" is suggested in which "Initiative and Risk-Taking" are scored as separate competences. This ensures that a soldier who takes a calculated risk and succeeds is not destroyed professionally by minor procedural infractions that are often found with this initiative.

Graph-3: Proposed Evaluation Weight Model



Source: Author's self-construct

Conclusion

The "imperfect hero" is not an anomaly to be purged but a paradox to be dealt with. The same qualities necessary to be the best in combat, an aggressive personality with risk-tolerance, are often at odds with the docile obedience demanded by army garrison discipline. In the case of Bangladesh Army, which is an institution striving in its equal measure to balance the regimentation of its colonial past and the spirit of determination of its liberation spirit; such kind of tension is not dysfunctional, rather vital.

The "equilibrium of excellence" is in neither absolute domination of discipline, nor unbridled freedom of the hero, but in the dynamic tension between the two. The results of the exploration indicate that a command philosophy of "zero tolerance" is empirically bankrupt as it applies to elite combatants; it threatens to remove the army's sharpest edges in pursuit of a smooth surface. Instead, the institution must come to grips with a "managed paradox" where high performers are held not to a standard of operational perfection but operational lethargy.

In all that, the soldier making the right modification to their kit to fight better, or bending a rule to save a life - it talk about humanity in war in the complex reality. They are the problem to the adjutant but a saviour to the commander. Wisdom is defined as knowing the difference.

Recommendations

- Shift from static discipline to dynamic talent management knowing that the effectiveness of combat often relies on flexible control.

- Improve the transparency of exercising disciplinary control to preserve high-value operational personnel.
- Reform the Annual Confidential Report (ACR) system utilizing competence-based evaluation model, emphasizing on tactical initiative and resilience.
- Operational performance to be emphasized more by rationalizing other associated attributes.
- Balance human resource allotment to operational suitability so as to maximize effectiveness on the battlefield and efficiency in institutional effectiveness.
- Paradox management needs to be integrated into leadership training at BMA in recognizing the difference between productive adaptability and act of harmful indiscipline.

Notes and References:

1. Emajuddin Ahamed, *The military, military government and democracy in Bangladesh*, New York: Springer, 2019.
2. Bangladesh Army, The Army Act, 1952. Ministry of Law, Justice and Parliamentary Affairs, Government of the People's Republic of Bangladesh, 1952.
3. Bangladesh Army, Army Doctrine Publication, General Headquarters, Bangladesh Army, 2020.
4. P. T. Bartone, 'Resilience under military operational stress: Can leaders influence hardiness?' *Military Psychology*, 18(1), 2006, pp1–16.
5. M. Berti and A. V. Simpson, 'The dark side of organizational paradoxes: The dynamics of disempowerment,' *Academy of Management Review*, 46(2), 2021, pp. 252-274.
6. M. Brzezinski, *Army of the brave: A history of the Bangladesh military*, University Press Limited, 2021.
7. Norman. F. Dixon, *On the psychology of military incompetence*, Jonathan Cape, 1976.
8. J. E.Driskell et al, 'Does stress lead to a loss of team perspective?' *Group Dynamics: Theory, Research and Practice*, 3(4), 1999, pp.291–302.
9. M. R. Endsley, 'Toward a theory of situation awareness in dynamic systems,' *Human Factors*, 37(1), 1995, pp.32–64.
10. P. A. Hancock and J. L. Szalma, *Performance under stress*, Ashgate Publishing, 2008.
11. E. P. Hollander, 'Conformity, status and idiosyncrasy credit,' *Psychological Review*, 65(2), 1958, pp.117–127.

12. S. P. Huntington, *The soldier and the state: The theory and politics of civil-military relations*, Harvard University Press, 1957.

13. M. Janowitz, *The professional soldier: A social and political portrait*, Free Press, 1960.

14. A. Kellett, *Combat motivation: The behaviour of soldiers in battle,* Kluwer, 1982.

15. M. R. Khan, 'Strategic culture of Bangladesh: Evolution and adaptation,' *Journal of International Affairs*, 19(2), 2015, pp. 23-45.

16. G. Klein, *Sources of power: How people make decisions*, MIT Press, 1998.

17. G. Klein, 'Naturalistic decision making,' *Human Factors*, 50(3), 2008, pp. 456–460.

18. A. C. Merritt, et al, 'Moral self-licensing: When being good frees us to be bad,' *Social and Personality Psychology Compass*, 4(5), 2010, pp. 344-357.

19. E. Miron-Spektor, 'Microfoundations of organizational paradox: The problem is how we think about the problem,' *Academy of Management Journal*, 61(1), 2018, pp. 26-45.

20. NATO Standardization Office. Allied Joint Doctrine (AJP-01). NATO Standardization Office, 2017.

21. A. Riaz, *Bangladesh: A political history since independence*, I.B. Tauris, 2016.

22. J. Shay, *Achilles in Vietnam: Combat trauma and the undoing of character*, Scribner, 1994.

23. W. K. Smith and M. W. Lewis, 'Toward a theory of paradox: A dynamic equilibrium model of organizing,' *Academy of Management Review*, 36(2), 2011, pp. 381-403.

24. J. Soeters, et al 'Military culture,' *Handbook of the Sociology of the Military*, New York: Springer, 2006, pp. 237-254.

25. UK Ministry of Defence, Mission command philosophy, Ministry of Defence, 2016.

26. United Nations Department of Peacekeeping Operations, Performance and accountability in United Nations peacekeeping operations, 2022.

27. U.S. Army Doctrine Publication Army Leadership and the Profession, Department of the Army, 2019, pp. 6-22.

28. U.S. Marine Corps. MCDP-1: Warfighting. Department of the Navy, 1997.

29. P. Ward et al, 'Training perceptual-cognitive skills: Can sport psychology research inform military decision training?' *Human Factors*, 53(2), 2011, pp. 155–169.

30. K. E. Weick and K. M. Sutcliffe, *Managing the unexpected: Resilient performance in an age of uncertainty* (2nd ed.). Jossey-Bass, 2007.

31. L. Wong and S. J. Gerras, *Lying to ourselves: Dishonesty in the army profession*, Strategic Studies Institute, U.S. Army War College, 2015.

Brief Biography

Lieutenant Colonel Syed Fazle Muneem was commissioned on 31st December 2002 in the Corps of Ordnance, with 47th Bangladesh Military Academy (BMA) Long Course. Apart from different regimental appointments, he served as Grade-1 Staff Officer in Army Headquarters (Ordnance Directorate), Grade-2 Staff Officer in 'Directorate General of Defence Purchase, Grade-3 Staff Officer in Headquarters in an Independent Engineer Brigade and an Independent Infantry Brigade. As Officer Commanding, he commanded a Division Ordnance Company. In addition to the mandatory courses, he completed Ammo Technical Officers Course, Bomb Disposal Course and Improvised Explosive Device Disposal Course. He obtained Masters of Biasness Administration (MBA) degree from Bangladesh University of Professionals (BUP). In the overseas capacity he served in the UN Peacekeeping Mission in Ivory Coast, Central African Republic and Abyei (UNISFA), Sudan. Presently, he is serving in a Border Guard Bangladesh Battalion as Commanding Officer.

The Unseen Battlefield: Stress Management and Necessity of an Organised Psychological Healthcare for Bangladesh Army

Lieutenant Colonel Rownak Azam, psc, G, Artillery

Abstract

Psychological well-being is a fundamental aspect of an individual's overall health, significantly influencing performance, resilience and interpersonal relationships. Military personnel face unique stressors due to operational demands, hierarchical structures and unpredictable nature of military duties. Bangladesh Army is no exception, with its personnel facing various individual, organisational and domestic stressors that significantly impact their mental well-being and professional performance. Despite Bangladesh Army's emphasis on physical fitness and operational readiness, psychological healthcare remains an under-focused domain. This article examines the sources of stress within Bangladesh Army, assesses its impact on individual and organisational effectiveness and critically evaluates the existing stress management framework, emphasizing the necessity of implementing an Organised Psychological Healthcare (OPH) system. Drawing insights from international military practices, the study highlights the pressing demand for an OPH system tailored to the unique requirements of Bangladesh Army. The proposed OPH structure includes short, mid and long-term interventions aimed at enhancing mental resilience, improving operational readiness and fostering a healthier work environment. The research underscores that addressing psychological health holistically can ensure a more resilient and effective military workforce, strengthening national security and personnel welfare.

Keywords*: Psychological Well-being, Military Stress, Organised Psychological Healthcare (OPH), Stress Management, Operational Readiness, Civil-military Health Systems.*

Introduction

Psychological well-being is a critical determinant of an individual's overall health, influencing personal resilience, performance and interpersonal relationships. In high-stakes professions such as the military, stress is an inherent factor due to the demanding nature of duties. Stress is a dynamic state in which a person is faced with a demand, opportunity, or restriction that is connected to what they want and for which the outcome is seen as both crucial and unknown.[1] It can be a definite challenge if it leads to constructive activities. It can also be detrimental if it results in negative consequences like illness, poor performance and impaired interpersonal relationships. Every tier of any organisation experiences some degree of stress and it is intrinsic in the social paradigm. Sharma stated that it not only disturbs the physical and mental wellbeing of a person but also affects the organisation in terms of productivity or performance.

Stress in a professional organisation is a common phenomenon across occupations and it affects professional efficiency. Consequently, the pressure on an individual in the workplace adversely affects his personal and social life. According to Dixit, soldiers are not an exception, with the caveat that they are relatively in a situation that is conducive to stress.[2] Bangladesh Army, as a key pillar of the nation's defence architecture, has consistently demonstrated its commitment to safeguarding national sovereignty and contributing to global peacekeeping efforts. However, the demanding nature of military service, characterised by high-stakes operations, prolonged separation from family and exposure to traumatic events, places significant psychological strain on its personnel. The impact of stress has a domino effect leading to many consequences.

The prevention and management of workplace stress require organisational level interventions because in most cases, it is the organisation that creates the stress.[3] The concept of Organized Psychological Healthcare (OPH) is yet to be implemented in Bangladesh Army. Besides, a survey conducted by Johns Hopkins Bloomberg School of Public Health in 2015 states that across all nations, a large proportion of military personnel who experience mental health problems do not seek help. Hence, an OPH structure is a need of time to manage the organisational stress of the members of Bangladesh Army.

At this backdrop, an attempt has been made in this paper to identify the prevailing psychological stress faced by the military personnel, particularly by the members of Bangladesh Army. The paper then examined various negative impacts of stress on the professional performance of military personnel. Consequently, it endeavoured to assess the existing Stress Management System in Bangladesh Army. Finally, the paper endeavoured to suggest a probable OPH structure for Bangladesh Army based on studying contemporary militaries across the world in order to reduce the adverse effect of stress in Bangladesh Army.

Sources of Stress in Perspective of Bangladesh Army

Stress in General: Mohan defined stress as the state of tension created from workloads, family and any external sources.[4] Dumbali identified it as the rate of all wear and tear caused by life. Generally, people are affected by stress from various organizational, workforce and human sources.[5]

Stress in the Military: Security experts identified that military personnel confronts unique and versatile stress conditions. Young added that almost a quarter of military members have symptoms of at least one mental health condition, with more than 10% qualifying for a diagnosis of two or more mental illnesses.[6] Khaled, in the context of Bangladesh Army, stated that apart from the traditional military task 'war', an army person also experiences stress during

peacetime through the demands of routine jobs, personal issues, national crisis, etc. Military specific stressors can be, but not limited to, some aspects which are shown below:-

Figure-1: Sources of Stress (Military Perspective)

Source: Young, *Military Mental Health*, 2016

Apart from organisational stressors, quite a few individual, domestic and social stressors also affect a military person.[7] Moreover, Uddin found that different stressors impact differently on Bangladesh Army personnel based on their professional and family status, mental agility etc.[8] Rokan suggested that these stressors can have substantial impacts on the performance, functioning and effectiveness of military personnel.[9]

Individual Stressors: Following individual stressors have been identified by the writer which affect military personnel in performing their professional duties:-

Perception of Extra Responsibility: Stress is an individual phenomenon. What is stressful to one may not be stressful to others. Due to the lack of workforce and extra workload, an individual perceives extra responsibility as a source of stress.

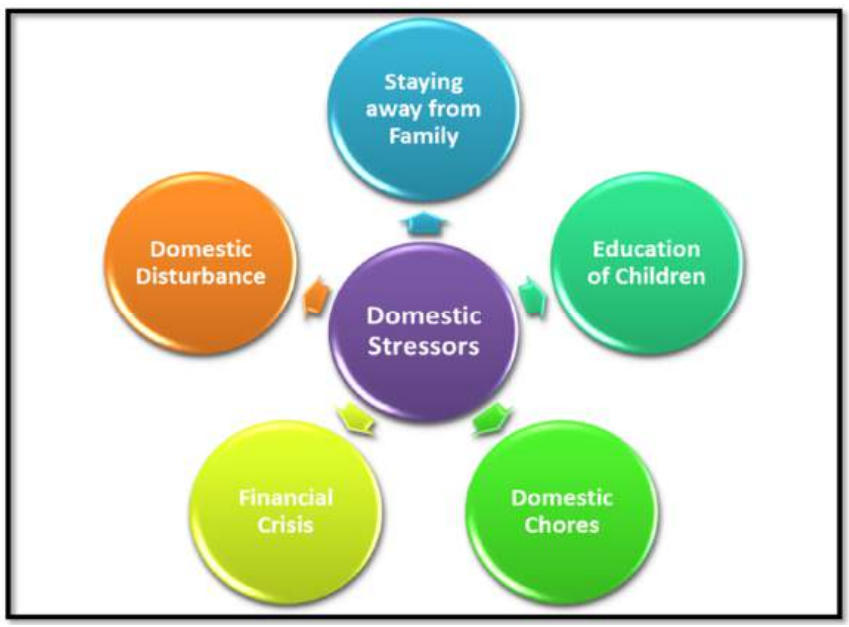
Zero Error Syndrome of Superiors: Perfectionists tend to magnify the negative impact of stress because they derive their sense of self-worth from their perfect performance. Consequently, perfectionist superiors suffer from Zero Error Syndrome, which puts extra pressure on the under commands. This resultantly causes negative stress.

Social Apathy: Dr G.R. Golencha, a Psychiatrist in the Indian Army, identified Social Apathy as an essential stressor for military personnel. In the present socio-economic environment, a significant share of Bangladesh Army personnel perceives social apathy acting as a stressor.

Absence of Expert Counselling: Dixit identified that lack of expert counselling leaves a void in the system despite increasing instances of stress among soldiers.[10] Due to inadequacy of professional experts and lack of knowledge of the direct leaders, members of Bangladesh Army do not have easy access to psychological counselling. This aggravates their stress condition.

Domestic Stressors: Lieutenant General N K Parmar, ex Director-General of Armed Forces Medical Services of Indian Army, stated that more often, it is a problem back at home that makes a soldier feel helpless and drives him/ her to suicide than work-related stress.[11] This statement also holds good for Bangladesh Army persons. The lower tiers are more affected by domestic stressors due to staying away from their family and unable to perform their duties to families when required.

Figure-2: Domestic Affairs as Source of Stress



Source: Author's self-construct

Organisational Stressors: While individual stressors impact an individual, like any other job, military persons are exposed to substantial organisational stressors at workplace. The writer

conducted extensive literature review, survey and Focus Group Discussions (FGD) and identified the following:-

Shortage of Officers: Suman stated acute shortage of officers as the principal factor for increasing stress in a unit. Shortage of officers results in excessive pressure on the junior officers, unavailability of experienced officers in need, added responsibility over the JCOs and lack of constant supervision.[12] Resultantly, it performs as a significant stressor.[13]

Scarcity of Under Commands: Apart from the shortage of officers, shortage of under commands also contributes to stress. FGD 1 identified under commands as the prime movers on ground and therefore, their scarcity tests the management as well as balancing skill of the leaders.

Indecisive Leadership: The leader who is inactive or indecisive may fail and lose the respect of the followers. Besides, a leader gives goals to the followers that help to alleviate stress on both follower and leader. Hence, an indecisive leader causes stress to the under commands. FGD 1 and 2 augmented that this depends on the leadership environment of the unit.

Large Workload: Workload in Bangladesh Army has been increased with time. FGD 2 stated that large workload with manpower constrain puts stress on an individual.[14]

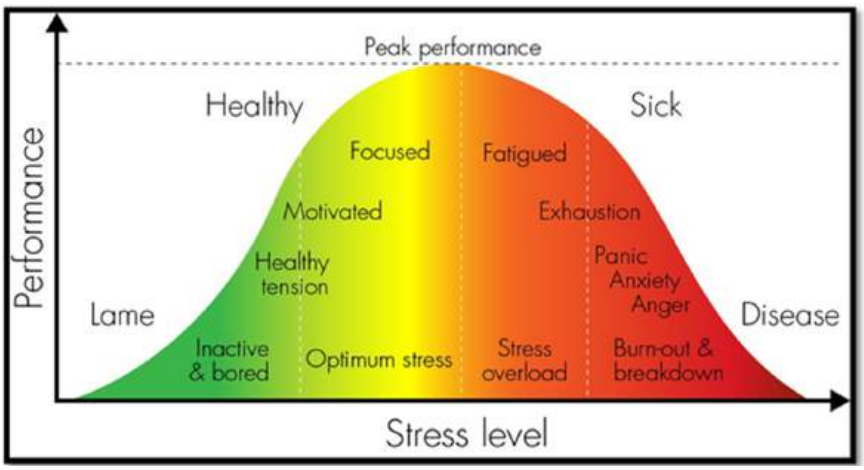
Denial of Leave When Required: Significant members of FGD 2 stated that denial of leave even in times of extreme need ostensibly on the grounds of exigencies of service, operational requirements and shortage of manpower becomes a sensitive issue if the affected soldier is not able to attend social obligations towards his homes, it becomes a cause of stress.

Retiring Blue: Both FGD 1 and 2 stated that military personnel retire at a comparatively much younger age. This is the time when they are expected to perform major domestic responsibilities. Starting career afresh at this age is not an easy proposition. This leads to a high level of stress among the military personnel.

Negative Impacts of Stress on Professional Performance - Bangladesh Army Perspective

Stress-Performance Relation: The Yerkes–Dodson law describes an empirical relationship between pressure and performance. It dictates that performance increases with physiological or mental arousal, but only up to a point. When levels of arousal become too high, performance decreases.[15]

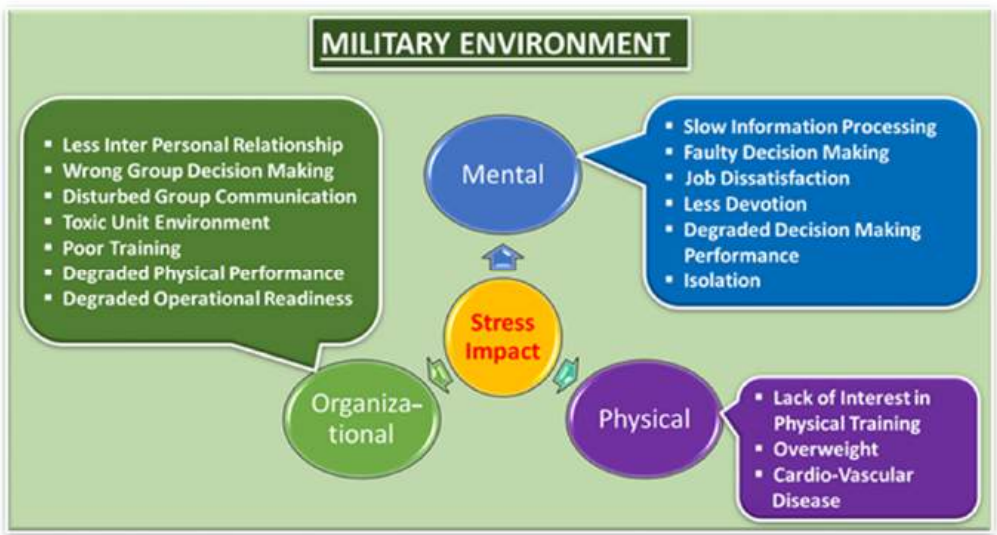
Figure-3: Yerkes – Dodson Stress Curve



Source : https://thestressnest.com the-resilience-factor

Negative Impacts of Stress in the Military Environment: Many scholars like Hossain, Uddin and Khanam agreed that an organisation with high-stress environment experiences increase in absenteeism, decline in discipline, decreased productivity, unhealthy environment, dissatisfaction towards service etc.[16] The significant negative impacts identified are delineated in the following model:-

Figure-4: Negative Effect of Stress in Military Environment



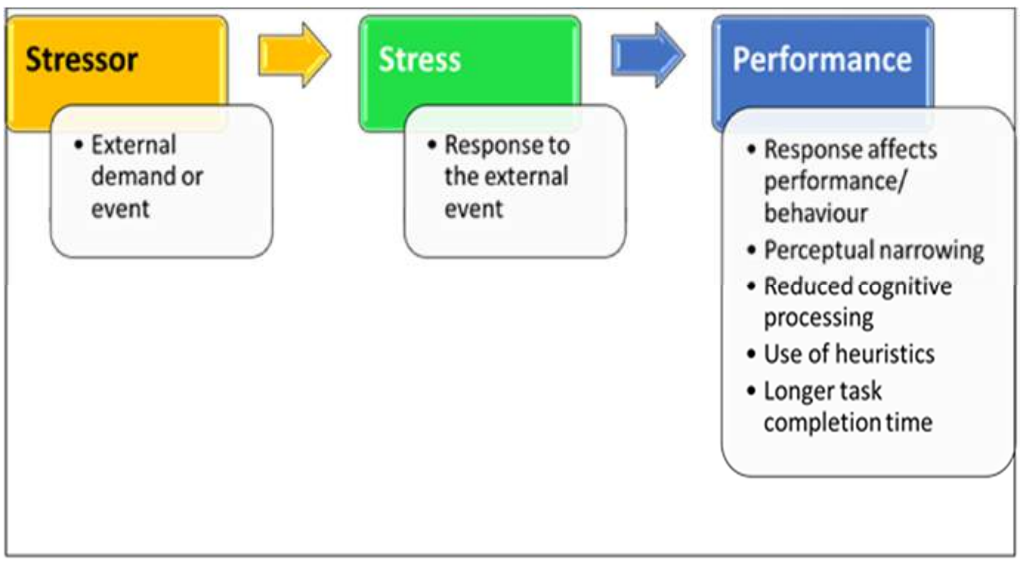
Source: Author's self-construct

Negative Impacts of Stress on Performance- Bangladesh Army Perspective: Bangladesh Army members experience negative impacts of stress on both individual and professional performance. These are described below:-

Impact on Individual Performance: Hossain, Akhter and Uddin narrated that stress has different impacts on individuals depending on their mental aptitude, status and workplace environment. Generally, stress affects military personnel by degraded performance, faulty decision making, job dissatisfaction, sleep deprivation, lack of interest in training activities, irregular food intake, increased heart rate/nausea, increased smoking etc.[17]

Impact on Professional Performance: Huq and Khaled implied that individual impacts of stress, as a consequence, adversely affect the organisation. Stress-Performance Model substantiates the statement by a stress-performance model as given in following Figure-5:-

Figure-5: Stress – Performance Model



Source: J Kavanagh, *Stress and Performance*, Santa Monica, 2005.

Existing Stress Management Structure of Bangladesh Army and its Evaluation

Sarwar identified that Bangladesh Army emphasized physical wellbeing more than psychological wellbeing.[18] Health is a state of complete physical, mental and social wellbeing. Nevertheless, ironically, Bangladesh Army has not yet emphasised mental wellbeing. FGD 1 and 2 stated that stress management in Bangladesh Army is not sufficient and it demands immediate

attention. With only a Psychologist posted in BMA the existing stress management structure, is limited to the Psychiatric Department in CMHs as discussed below:-

Department of Psychiatry in CMHs: Presently, Bangladesh Army has 18 CMHs. Among them, only 11 CMHs have Psychiatry Department. Among those 11 CMHs, few are running by attaching Psychiatrists from other CMHs.

Psychologist Posted in BMA: BMA is the only institution in Bangladesh Army where to perform his traditional job. Expert opinion is that the number is not sufficient to monitor and counsel a large number of cadets. Apart from this, there is no other psychologist authorised in any institution of Bangladesh Army to counsel mentally distressed persons.[19]

Psychologist Posted in ISSB: Total about a dozen of Psychologists are authorised in ISSB to analyze the mental perspective of the candidates. They do not deal with mental health.[20]

Evaluation of Stress Management Structure in Bangladesh Army: The researcher conducted separate survey for officers and JCOs/ORs and interviewed professional scholars and senior leaderships to analyse the existing stress management system in Bangladesh Army and identify its effectiveness. The findings are appended below:-

Insufficient Psychiatric Care: Akhter (2020) stated that psychiatric care in Bangladesh Army is insufficient. The researcher identified only 18 CMHs have Psychiatric Department. Among them, 3 CMHs are running by attaching Psychiatrists from other CMHs. 7 CMHs (Category D and E) do not have any authorised Psychiatric Department.[20]

Lack of Individual Knowledge in Stress Management: Bangladesh Army members in general, do not have sufficient knowledge of stress management. FGD 1 and 2 also substantiated that maximum responders do not have adequate knowledge about stress management procedure.

Negative Perspective about Psychiatric Patient: Persons seeking psychiatric help experience social and organisational stigma. His/ Her professional career also becomes uncertain. FGDs identified that a negative perception exists regarding a person treated in the Psychiatric Department.

Social Stigma Obstructs Mental Treatment: Khanam stated that psychiatric treatment is a taboo in Bangladesh Army perspective. Social stigma restricts a person to avail psychiatric treatment. FGD 1 and 2 found that social stigma discourages them from seeking psychiatric help.[21]

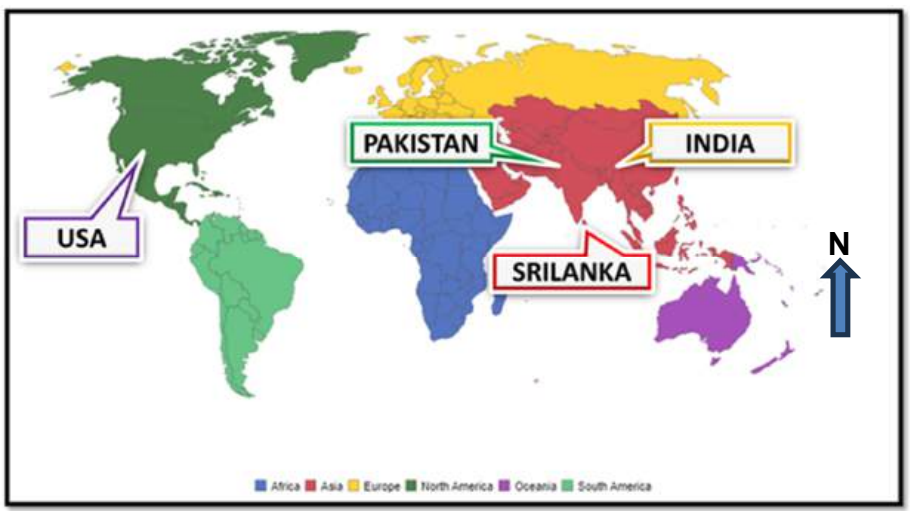
Absence of Psychological Counselling: Psychiatrists diagnose mental illness and provide treatment for complex and severe mental illness whereas, psychologists focus on providing psychotherapy to help people with emotional and mental suffering. Ironically, only one psychologist is authorised in BMA to deal with the mental health of enormous number of cadets. Hence, a void of psychologists is severely felt in Bangladesh Army.[22]

Probable Structure of Organised Psychological Healthcare in Bangladesh Army

All the quantitative and qualitative analyses indicate an insufficient Stress Management Structure persisting in Bangladesh Army. Mental health is a part of physical wellbeing. Bangladesh Army has scope to improve in this aspect. Through extensive interviews, survey analysis, FGD and content analysis, the researcher has been convinced about the necessity of an OPH structure in Bangladesh Army in order to enhance Professional Stress Management.

Organised Psychological Healthcare Structure of Armies across the World: In order to suggest an effective OPH structure for Bangladesh Army, the researcher studied the Psychological Healthcare (PH) arrangement of various armies of the subcontinent and the US Army as shown in the figure. The key takeaways are discussed below:-

Figure-6: OPH Structure of Various Armies Consulted



Source: Author's self-construct

US Army: The US Army has emphasised mental health adequately and organised their PH structure accordingly. Based on various content analysis, the researcher identified the following PH structure in the US Army:-

Army Level: Psychological Health Centre of Excellence (PHCoE) is responsible for providing PH facilities to the US Army. PHCoE's mission is to improve the lives of US service members, veterans and families by advancing excellence in psychological health care and prevention of psychological health disorders.[23].

Corps Level: US Army has Medical Company, Combat Stress Control (CSC) authorised against each Corps in a theatre. It provides comprehensive CSC support to under command two or more divisions.[24]

Division Level: The division mental health section is the medical element in the division with primary responsibility for assisting the command in controlling combat stress.[25] The organisation is given below:-

Figure-7: Organisation of Division Mental Health Section (US Army)

Source: *US Army field manual* 8-51, p. 22

Brigade and Unit Level: One Behavioural Science NCO is routinely detailed to assist the brigades with mental health. This NCO performs duties as the mental health liaison NCO and brigade CSC coordinator. The brigade CSC team conducts site visits to all the units frequently.

Other Measures: Apart from the facilities mentioned above, the US Army conducts various awareness programmes to promote mental wellbeing for its members. Besides, seeking psychological help does not affect career in US Army.[26]

Indian Army: Tyagi provided an overview of the PH structure of the Indian Army. Every member of the Indian Army has to go through psychological checkup by professionals before deployment in the operational area. If identified any disorder, the individual is treated accordingly. The organisation assures that seeking psychological help does not affect the career of an individual unless it is sought with ill-intention. Besides, psychologically affected

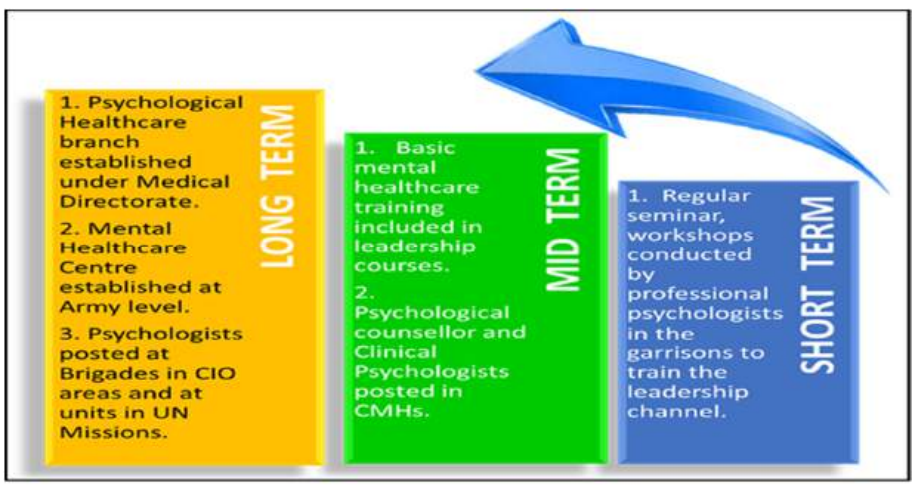
individuals are categorised as 'S' category in the Indian Army. Their employment and deployment are taken under consideration to recover them from organisational stress.[27]

Sri Lankan Army: Sri Lankan Army started giving attention to address PH of its members in recent days. Perera stated that OPH structure of the Army is supervised by a Psychology Cell under Medical Directorate. Besides, in every Security Force (Corps), Sri Lankan Army is establishing one Counseling Cell composed of Psychiatrists, Psychologists and professional counsellor. The cell conducts periodic training sessions, workshops and interview affected persons for identification and subsequent measures for recovery.[28]

Pakistan Army: Pakistan Army advocates preventive measures rather than cure. Mehmood provided an overall idea about the OPH structure of Pakistan Army. Using the Office Automation System, any distressed officer can directly seek assistance from the Counseling Section of Military Secretariat Branch, Army Headquarters. He is then directed towards concerned experts for necessary assistance. Besides, every unit has to undergo Post Deployment Counseling Session after completing any major deployment.[29]

Suggested OPH Structure for Bangladesh Army: For timely identification of mental distress and effective response to it, Bangladesh Army may develop OPH structure at the unit, formation and army level. The structure can be developed under short, mid and long-term arrangement as described below:-

Figure 8: OPH Structure for Bangladesh Army (Time Based)



Source: Author's self-construct

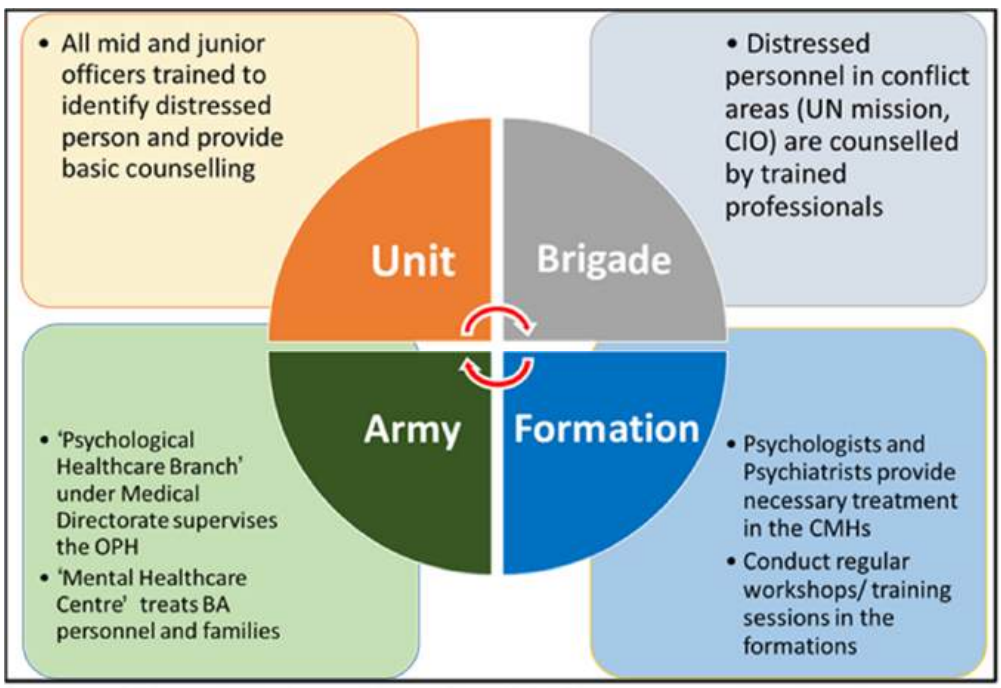
Short Term: All mid and junior level officers should be able to identify a mentally distressed person and provide him/her immediate counselling or refer for further

treatment by the professionals. Accordingly, regular seminar, workshops and short training sessions may be arranged quarterly basis at formation level.

Mid-Term: Formation and Army level intervention may be conducted on mid-term basis. At formation level, Psychological Counsellors and Clinical Psychologists may be posted in CMHs. Mentally distressed persons may be counselled by the professionals there. Severe cases may be treated by the clinical psychologists/ psychiatrists depending on the criticality of the patient. At Army level, basic mental healthcare training may be included in the leadership courses, i.e. Junior Commissioned Officers' Course, Junior Command and Staff Course and Army Staff Course.

Long Term: Formation and Army level intervention may also be conducted at long term. At formation level, 'Psychological Healthcare Detachment' may be included in the TO&E of the brigades operating in conflict-prone areas. Psychologists may be posted for providing immediate support to the distressed person. At army level, a separate 'Psychological Healthcare Branch' may be established under the Army Headquarters, Medical Directorate in order to supervise the PH of Bangladesh Army.

Figure-9: Capabilities of the OPH Structure at various levels



Source: Author's self-construct

Conclusion

Stress is a dynamic condition which is intrinsic in the social paradigm. It can be detrimental if it results in negative consequences like illness, poor performance and impaired interpersonal relationships. While disturbing the physical and mental wellbeing of a person, stress also adversely affects an organisation. The armed forces are no exception to that. In this context the incumbent Chief of Army Staff General Waker-Uz-Zaman, SBP, OSP, SGP, psc very rightly avers, "Do not be overstressed, maintain work-life balance, practice religion, give time to family and reduce offences like extra marital affairs, drugs, attempt to suicide etc."

Bangladesh Army personnel are affected by individual, domestic and organizational stressors at their day-to-day life. Consequently, it is adversely affecting their individual as well as professional performance. As a result, the overall performance of the Army is being affected. Bangladesh Army has given substantial effort in taking care of the health of its members. Ironically, mental wellbeing, an important part of health, did not achieve due attention.

The OPH structure of Bangladesh Army is not sufficient to deal with the mental health issue of the members of the Army. All the CMHs do not have Psychiatric Department. Except BMA, none of the organization is authorized with Psychologist to perform their traditional job. Hence, a holistic approach is needed to develop an effective OPH structure for Bangladesh Army in order to sustain morale, ensuring operational efficiency and safeguarding the long-term well-being of its members.

Notes and References

1. S. P. Robbins, *Organisational Behaviour: Concepts, Controversies and Applications*, New Jersey: Simon & Schuster Company, 1993.

2. C. K. Dixit, *Addressing Stress-Related Issues in Army*, New Delhi: Institute for Defence Studies and Analyses, 2011.

3. T.Cox et al, *Work Organization and Stress: Systematic Problem Approaches for Employers, Manages and Trade Union Representatives*, Geneva: World Health Organization, 2003.

4. S. Mohan, 'Interrelationship between Stress Due to Inadequate Salary and Rewards and Marital Discord: A Study of Indian Army Officers,' *International Journal of Advanced Research in Management and Social Sciences- 3*, 2013.

5. S. Dumbali, Retrieved on 24 August 2017from https://www.mbarmytuts.com/stress-management-a-step-towards-success.

6. J. L. Young, 'Military Mental Health,' *Psychology Today,* 2016. Retrieved from https://www.psychologytoday.com/us/blog/when-your-adult-child-breaks-your-heart/201606/ military- mental-health.

7. Interview with Lieutenant Colonel Jesmin Akhter, MBBS, MCPS, FCPS, Stress Management and Organised Psychological Healthcare in Bangladesh Army on 11 June, 2020.

8. Interview with Professor Doctor Md Kamal Uddin, Stress Management and Organised Psychological Healthcare, on 07 April 2023.

9. Lieutenant Colonel H R M Rokan Uddin, 'Stress- Its Effects and Management in the Army,' *Bangladesh Army Journal* 2000, p. 59

10. C. K. Dixit, *op. cit*.

11. Kamini, Sharma, 'Stress Management – Coping Strategies,' *International Journal for Educational Research Studies*, 2016 p. 564.

12. FGD 1 conducted on the Stress and its impact on the officers of Bangladesh Army on 22 November 2024 and FGD 2 conducted on the Stress and its impact on the JCOs and Other Ranks of Bangladesh Army on 29 November 2024.

13. *Ibid*.

14. FGD 2, *op. cit.*

15. R. M. Dodson, 'The Relation of Strength of Stimulus to Rapidity of Habit-Formation,' *Journal of Comparative Neurology and Psychology*, 1908, pp. 459-482.

16. Interview with Major Sabbir, Hossain, psc. (2011). Stress Management for Mid-Level Officers of Bangladesh Army on 29 September 2011.

17. Interview with General Abu Belal Muhammad Shafiul Huq, SBP, ndc, psc (retired), Combating Stress in the Army on 25 January 1992.

18. Interview with Major Fahim Sarwar, psc, G, Organisational Approach to Psychological Healthcare: A Need of Time, 11 February 2019.

19. Interview with Lieutenant Colonel Jahangir Alam, psc, M Phil (Psy), Stress Management and Organised Psychological Healthcare. 13 March, 2024.

20. Interview with Lieutenant Colonel Jesmin Akhter, *op.cit.*

21. Interview with Professor Doctor Mehtab Khanam, Stress Management and Organised Psychological Healthcare, on 05 March 2023.

22. Md Jahangir Alam and Marzia Dulal, 'Coping Strategies of Stress Tolerance in Relation to Military Training,' *Global Journal of Human-Social Science (A)*, 18(3), 2018, p2.

23. PHCoE. Psychological Health Centre of Excellence, Retrieved on 23 August 2020 from https://www.facebook.com/PHCoE.

24. FM 4-02.51, Combat and Operational Stress Control. Washington, DC, Chapter 3, 2006.

25. FM 8-51, Combat Stress Control in A Theater of Operations. Washington, DC, Chapter 2, 1994.

26. D. H, Peter, 'Stress and Emotional Well-Being in Military Organizations,' *Research in Occupational Stress and Well Being*, 2013, p. 11.

27. R. Y. Razak, 'The Impact of Work Stress Towards Work-Life Balance,' *International Journal of Economics, Commerce and Management*, 2014, pp. 23-36.

28. Kamini, Sharma, *op. cit.*

29. Major General Mrinal Suman, Retrieved on 06 March 2009 from http://www.indiandefence review.com: Indian Army and Management of Stress.

Brief Biography

Lieutenant Colonel Rownak Azam, psc, G+ was commissioned on 20th June 2007 in Bangladesh Army in the Corps of Air Defence. He served in various capacities of command, staff and instructional appointments. He is a graduate of Defence Services Command and Staff College, Mirpur. He has commanded an Air Defence Regiment. He served as a military observer in Ivory Coast under UNOCI and Chief Operations Officer of a Bangladesh Contingent in MONUSCO. At present, he is serving as Senior Instructor Gunnery in the School of Air Defence Artillery.

Managing Generational Differences in Bangladesh Army: Integrating Generation Z into Military Culture

Lieutenant Colonel Forhad Ahmed, psc, Artillery

Abstract

It is important for Bangladesh Army that there are more of a new generation for the service of Bangladesh Army. Defined by rapid technological advancement, digital connections and changing societal values, this generation believes to hold its own unique opinion on leadership, communication, training and professional identity. The traditional norms of discipline, chain of command and cohesion amongst all the members of any unit are a prime component for effective performance in the field and operational environment, but due to unresolved generational gaps, these values along with morale and readiness can be undermined. This article explores interplay of the characteristics of Generation Z playing in the same pitch with the traditional military culture of Bangladesh Army as manifested in leadership patterns, command authority, training procedure, communication protocols, cognitive and physical endurance. On the basis of experience from global military, it is suggested that these challenges do not signify compromise of military values but can be attributed to changing patterns of socialization. It finds that kind of adaptive leadership in deliberate training and robust institutional affiliation can play a significant role in addressing Generation Z.

Keywords*: Generation Z, Military Leadership, Command and Control, Training Adaptation, Discipline and Cohesion, Combat Readiness.*

Introduction

Like any professional institution, Bangladesh Army has changed over the years to accommodate with the military ways of war fighting, operations and social order. Current trends Generation Z officers and soldiers are on the upswing. This is a generation that came of age in the world of rapid change. They are living in a high tech, digital and super information rich environment. Bangladesh Army is a time-honoured organization where discipline, loyalty, obedience and selflessness are the inviolable duties. But these newcomers now need to be integrated, which will pose leadership and maybe more importantly, a resource problem. Generation gaps are contributing factors to deterioration of unit esprit de corps. They also damage the morale and mission-readiness necessary to respond to operational demands.

The command element, hierarchical and regimentation was still preserved by Bangladesh Army. This culture of the army has taken it through conventional to counter insurgency operations and from the relief role in the face of disaster to that of United Nations peacekeeping.

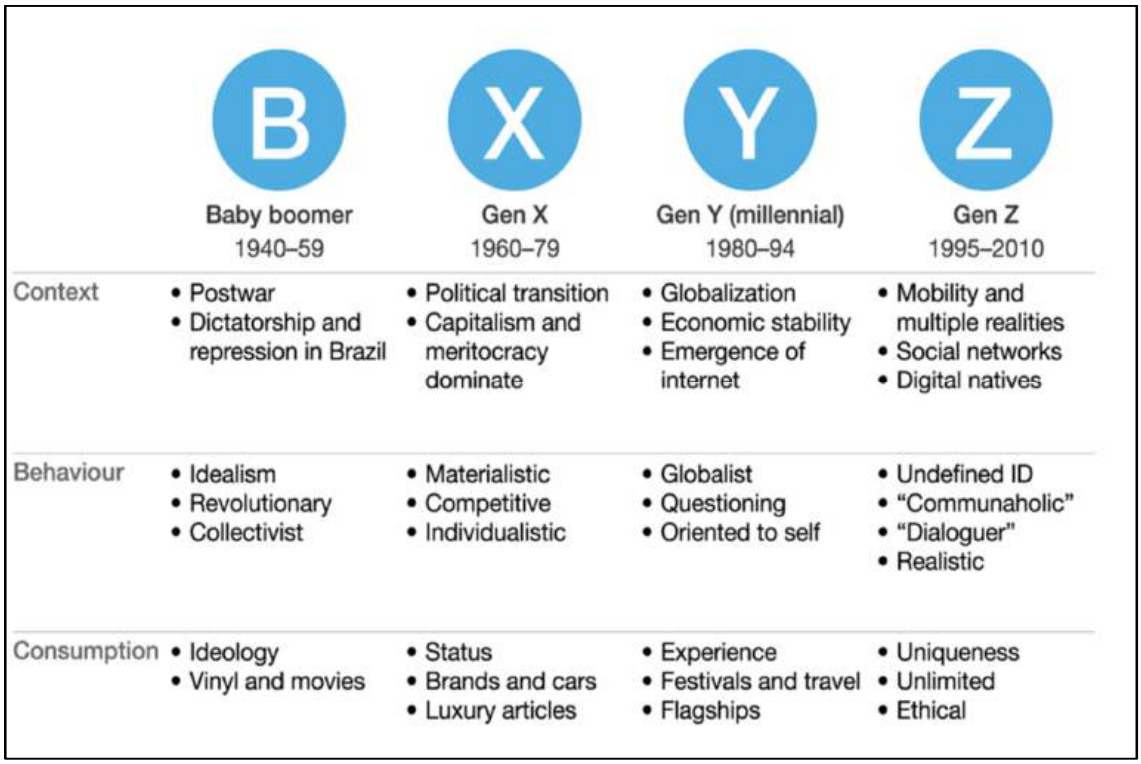
Military members from Generation Z are exposed to a constant supply of information and interactive technology. Some common objectives include shared information, ongoing performance evaluation, principle-based leadership, personal and professional development. This may seem paradoxical. When these diglossia differences are not thoroughly understood and mediated, it can cause strain between generations. They may also, in turn, lead to team suspicion and retention problems.

Crossing the generational gap inside Bangladesh Army, especially when Generation Z has to become a part of its very fabric, is not an easy task. There is an obvious conflict between Generation Z and the military with regards to leadership, training and management. Far from compromising on the discipline or command authority, in a flexible way of thinking in leadership, in this sense works well in supporting Generation Z officers or soldiers to move to Bangladesh Army, as the article suggests. As Bangladesh Army continues to build for the future, develop leaders and prepare units for combat readiness in more complex and technologically centered conflict, it will be affected by the younger generations of officers and soldiers.

Conceptual Understanding of Generational Differences

According to generational cohort theory, denominational differences have ultimately less explanatory power than the shared experiences among members of a generation that is born in a common period of time and social context which lead to common attitudes, values and behaviour in their professional lives.[1] These generational phenomena of common traits that apply to this generation thinking about authority, discipline and the legitimacy of leadership and the professional identity in a hierarchical organization such as the military condition how soldiers begins to perceive both of these.[2] Military institutions are especially sensitive to changes in generations, given that they must depend on a strict chain of command, uniform socialization and a collective control of self under high uncertainty and stress. Prior generations of military service were heavily socialized into organizations with hierarchical authority, restricted information flows and career incentives to obey and remain loyal over the long term. In contrast, Generation Z have seen the rise of instantaneous access to information, rapid technological transfer and the challenge of competing views resulting in soaring demand for transparency in decision-making and a longing for motivations that are also easily identifiable with regular communication with leadership.[3] And those differences could cause one to judge too harshly the behaviour of Generation Z as not being overly disciplined and respectful authority, when they are more a representation of various socialization practices than an eroding military ethos. This is why an abstract understanding of the generational chasm serves to enlighten those who exercise military leadership concerning the distinction between attitude-based demarcation and infidelity vis-a-vis discipline or professionalism.

Figure-1: Generational Cohort as Per Time



Source: www.brightmarkconsulting.com/insights/meet-the-newest-generational-cohort-who-is-gen-z/

Generational differences represent a juncture with the military organization's basic assumptions, shared values and practices. Traditional military virtues of conformity, fellowship and subordination are encouraged by the structure of groups, modes of training, ceremonial behaviour and top-down decision-making. But Generation Z military members prioritize meaning and regularly being recognized for good work, all while observing ethical and competent leadership attributes instilled through feedback-rich educational and technology experiences.[4] If those expectations are met with autocratic styles of leadership that heavily rely on legitimate power, it is not hard to believe that tensions would be high and morale, trust and future commitment low. This tension is not indicative of a discipline deficiency, rather it signifies that an authority that command should be sought after by leadership through knowledge, mentorship growth and clear vision.[5] In conceptual understanding, responding to the problem of intergenerational management requires a balancing of continuity and change in organizational life, continuity of fundamental military values and adjustment of leadership principles so that they are appropriate to new generations.

Generation Z Variation of the Military Careerist

At the vanguard of these trends are those serving in today's armed forces: Generation Z, or those born after 1997. Exposure of constant technology change and information access has conditioned their attitudes to the workplace.[6] Generation Z with their heavy reliance on technology and general adaptability to command networks, simulation-based training and data rich operational worlds is readily available skills that match the requirements of contemporary militaries, in which situational awareness, capability to respond and successful integration with technology are all questions of discipline. But they are probably more comfortable than those generations that have been in open digital environments and their members will need to receive enhanced military training in information discipline and judicious use of social media.[7]

Table-1: Bangladesh Army Culture Comparison Table

Aspect	Traditional Military Culture	Generation Z Perspective	Required Balance (Bangladesh Army)
Core Values	Conformity, Fellowship, Subordination	Meaningful Work, Recognition	Preserve core values with contextual adaptation
Leadership Style	Top-down, authority-based	Ethical, competent, feedback-oriented	Authority built through knowledge and mentorship
Training & Learning	Structured, ceremonial, rigid	Technology-driven, feedback-rich	Modernized training within military discipline
Source of Tension	Autocratic command approach	Expectation of participation and respect	Adjust leadership without weakening discipline
Organizational Outcome	Order and control	Motivation and commitment	Cohesiveness and operational effectiveness

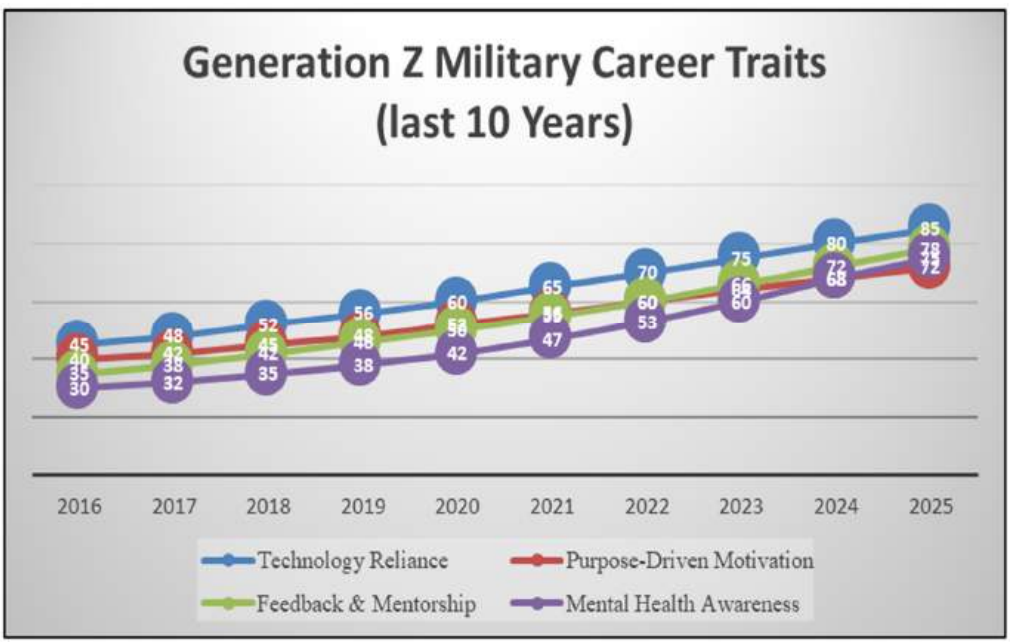
Source: Author's self-construct

Generation Z also wants to know why and value purpose in what they do.[8] On the other hand, whereas past generations of service members would just follow orders via positional authority, Generation Z is more likely to be persuaded when operations have a purpose and connections are relevant. They participate more when tasks are put in common sense and goal

term language. It is not about rigid resistance to discipline, it's a style of cognition evolving in the era of problem solving and feedback.[9] Generation Z also places on real-time performance reviews, mentorship and career growth; they socialized in digitally and educationally rich environments where real-time feedback is the norm. Consequently, it is the kind of leadership based on command legitimacy, moral behaviour, professional skills and achieving timely guidance would win their trust, motivation and lasting loyalty.[10]

Mental health, resilience and well-being are increasingly the topics on the radar of Generation Z's as it rapidly becomes a point for public conversation in the media. In the military domain, which is often quite rigid, this positive characteristic can be played with using formal resilience training, by providing support structure through counselling and by having an effective command and leadership. Moreover, when these attributes are properly managed it will help the establishment of military ethos. Bangladesh Army would need to know these generational traits to effectively socialize Generation Z officers and soldiers into a military custom without compromising discipline or combat efficiency.

Figure-2: Military Career Conceptual Trend



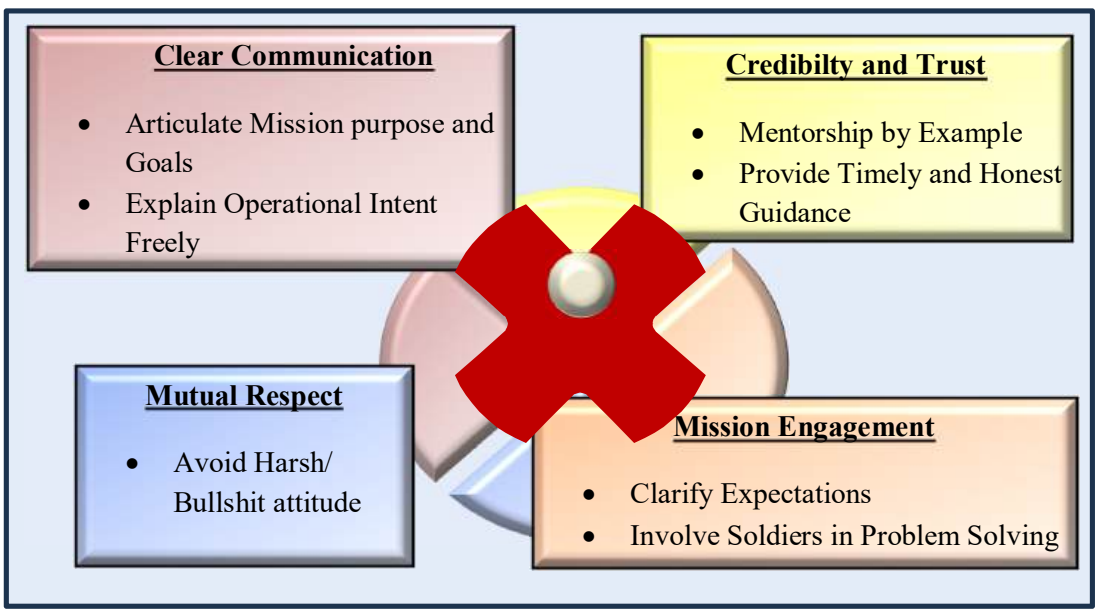
Source: Author's self-construct

Leadership and Command Dynamics: The dominant leadership style in the Bangladesh Army has always been based on authority, destiny and very much loyal follower of chain-of-command that is indispensable for operational control and mission success.[11] But integrating Generation Z staff requires appropriate use of command authority in which an effective and

credible leader, ensuring that the way is clear.[12] Indeed, in modern training and peace-keeping deployment, young leaders who articulate the mission goals and operational intent freely before their soldiers are likely to maintain both discipline and morale of the lower ranks. In contemporary operations or on exercise young leaders who command by explanation achieve greater levels of compliance from younger soldiers while maintaining a higher level of morale among troops than those who use command as being prescriptive.[13] This command model derives its authority more from trust and professional respect than positional power.[14] Generation Z military members are typically receptive to mentors who also avoid bullshit attitude, especially when the righting of things is prompt and constructive. This kind of leadership does not diminish command; it reinforces cohesion as it makes sure that orders are heard, taken in and carried out with zeal. Adaptive leadership to include both authority and engagement in Bangladesh Army increases unit effectiveness while maintaining an undiluted military culture.

Communication and Information Flow Dynamics: In order to direct and guide Bangladesh Army, there has to be good communication right throughout the sector, from top down, for orders of operation as well as situational awareness.[15] Generationally, soldiers Generation Z are used to quick interactive and digital communication and they react favourably when information is kept brief, timely and put into perspective. Discipline in communication by incorporating modern methods and tools ahead of time keeps ranks clear, cohesive and understanding.[16] Adaptive communication techniques which bolster command efficiency and soldier's participation, allow the Army to retain power, discipline soldiers as well as sustain combat readiness in a multigenerational force.

Figure-3: Adaptive Leadership in Bangladesh Army



Source: Author's self-construct

Training and Learning Preferences: Education and training play a major role in the professional development of Bangladesh Army to develop competence, discipline and operational preparedness.[17] Generation Z soldiers have different styles of learning than their predecessors did and they are better suited to interactive, technology-based environments or scenario instruction. Structured guidance and direct transfer into practice, immediate feedback and the opportunity to use learned content in troubleshooting contexts are generally preferred. For this generation, lecturer-led or rote learning that has traditionally been used is not the best means to engage them for long-term retention and motivation.[18] Tailoring training to a blended approach will enable military objectives to be met while considering the learning profiles of younger soldiers.

Figure-4: Existing Challenges of Generation Z

Source: Author's self-construct

Cultural and Generational Gap: Arguably, one of the biggest challenges is generation and culture gap between senior officer and Generation Z as recruits.[19] Bangladesh Army culture has been characterized as being conservative, top-down, obedience-oriented and collectivist-

focused that is perpetuated during training, ceremony and field operations. Generation Z officers and soldiers often value the question of why they are doing what is being asked, having a voice to ask challenging questions and contributing to the workplace. This juxtaposition may possibly lead senior leaders to misread behaviour where a question or request for clarification is perceived as a refusal to obey an order. The divide can also affect mentoring, command confidence and inter-unit relationships. In the absence of interventions aimed at recognizing and accepting dimensions of such perspectives and styles differences, a high potential for misunderstanding, tension and reduced morale lurks particularly in multi-generational working environments.[20]

Technology and Information Management: Generation Z military members are digital natives possessing proficiency in information technology, social media and contemporary communication skills.[21] Although they can help to enhance operational efficiency, they also bring trouble in respect of security of operation, the disciplined use and management of information and the standardization operation procedures. Openness of information and informal channels of communication may result in inadvertent disclosure or inconsistency between units. Command echelons must fill the gap between junior officers' and soldiers' technological lives and the controlled world of military information management. Failure to use digital aid in a disciplined manner can risk operations security and undermine trust in communication systems.

Leadership and Career Expectation Mismatch: Mismatch of leadership aspirations and advancements rotation for career is another significant challenge. Our Generation Z officers and soldiers are accustomed to constant feedback, some form of coaching and a clear road ahead for advancement. This might result in young officers' and soldiers' dissatisfaction, demotivation and premature resignation. Senior leaders at time seem not to understand the generational mentality which may compound the problem. Without concerted intervention, this gap may take a toll on morale, unit effectiveness and the retention of high-quality trained military members.[22]

Mental Health and Resilience: A further issue is that Generation Z are perhaps more aware of mental health and well-being than what the previous generations were and could expect the assistance system to address stress and resilience better.[23] The work and mental order imposed on an individual through military service and operations, tough training, peacekeeping missions and internal security duties are enormous in Bangladesh Army. In the meantime, young officers and soldiers might be more open about how anxious they are, how tired or upset. This incompetent approach of those indications endangers performance, discipline and unity. Other issues include personnel and commitment shortfall. The latter means that if Generation Z military members are unhappy with the level of recognition or goals they want, there will be an immediate readiness to work outside of this Army. In most developed economies, prospects in technology at home and abroad are brightening. A soldier cannot stay resilient and engaged if the only way to appease all hopes and dreams with his life is for him or her to be always aspiring

after something. These kinds of problems will eventually result in a growing rate of dissatisfaction and this would raise a problem with the quality and ability of trained troops.

Physical Fitness Challenges: The issue of physical fitness is one of the unique issues at present in Bangladesh Army and Generation Z military members suffer from this phenomenon as well.[24] Younger soldiers are likely to have at least a rudimentary concept of health and activity level, but with sedentary living, dependence on devices and urban culture can come lower levels of baseline conditioning than in generations past. The Army has among the most physically challenging standards for soldiers in terms of endurance, strength and tactical mobility. Physical fitness requirement is not only for operational necessity but also to prevent injury and improve team capability in case of combat or response team operations. Ensuring a consistently trained force requires taking care of differences in initial fitness, motivation and resilience; such a challenge can cause pressure for instructors and for command echelons, during the recruit and unit training programmes.

Communication and Adaptation Issues: Younger soldiers, who have already developed efficient digital and instant communication abilities, the difficulty is in training them to direct this skill within formal military protocols, such as chain-of-command reporting or operational format.[25] Miscommunication, or over-reliance on unstructured approaches can result in errors, delays or disciplinary issues. They need to see that operational messages are followed precisely and such a message only comes from constant monitoring, repetition and teaching military discipline in communication. Moreover, the communication pattern between earlier generations with Generation Z is not matching due to the adaptation of both tiers.[26]

Experience from Global Militaries

Experiencing from the world's leading armed forces show that most of the problems associated with integrating Generation Z are not local or specific but have global relevance and concern different strategic cultures and armament. The United States of America army has struggled with physical fitness standards, discipline, retention of junior soldiers early in their career and later on during initial entry training and throughout preliminary leadership development phases. Given the lack of autonomous motivation and rigid hierarchy present in the Russian Armed Forces, it finds that challenges remain for sustaining motivation at younger ages through long training cycles and tough conditions, where tolerance for hardship appears to have dwindled.

The Chinese People's Liberation Army (PLA) also has found it increasingly difficult to reconcile the imperatives of ideological indoctrination and collective discipline with the demands of digitally native, technologically sophisticated conscripts.[27] The British Army and French Armed Forces have struggled with retention and engagement associated with differences between generations in learning preferences, authority expectations and length of service to be expected

being particularly acute in expeditionary and high-readiness units. In armies of the member countries comprising North Atlantic Treaty Organization (NATO), they are struggling to implement standardized discipline and communications protocols, as well as resilience training when coping with members of Generation Z who grew up on informal and instantaneous communication platforms. Even the Israel Defence Forces (IDF), has faced struggles in controlling digital addiction, operational security and physical/mental well-being of its young military members who serve in fast-paced combat zones.

Similar generational issues are also apparent in the regional armed forces. They have struggled to maintain a regimental culture and discipline with new recruits exposed to social media and civilian career prospects, especially on long counter insurgency stints. Some also faced problems in physical fitness standards, differences in authority from one generation to the next and retaining personnel within a discipline-oriented command structure. In a nutshell, these global military experiences show that the integration of Generation Z poses challenges that are not limited to military norms and cultures. These observations shave implications for Bangladesh Army in terms of prior identification of the organizational loopholes such as leadership performance, training capability, standard physical fitness, discipline tradition, dropout retention rate and ensuring preservation of the core military essence to sustain the operational productivity capability.

Approaches for Bangladesh Army

Institutional Orientation and Cultural Alignment Programmes: Integrating Generation Z in Bangladesh Army customs requires a strict and set institutional direction which will instill traditional discipline, culture, ethos and values amongst all the new members. Initial unit orientation and cultural alignment are very crucial for creating attitudes towards command echelons and organizational loyalty among new soldiers. During this phase the civilian values that have been transmitted through generations are confronted with military standards for the first time. Training centres and unit orientation programmes, therefore, bear the burden of adjusting institutional values to lived experience. The lack of alignment established in the early going that can create long-term unity challenges and allows for consistent messaging and familiarization with military standards of conduct to reinforce core values.[28]

Leadership Practices at Unit Level: Leadership practice is the predominant intermediate process at the unit level through which generational issues are addressed. Day-to-day interaction of command echelons and subordinate leaders with soldiers determines whether authority is viewed as legitimate and effective. However, in platoons and sections where discipline will be tested on a regular basis under physical, as well as psychological pressure points standards must be re-enforced by leadership by example of consistency. Generational tensions frequently manifest themselves in communication, feedback and involvement demands but clear purpose

leadership, combined with no-nonsense enforcement of orders will bring sustained unity of effort.[28] Hence the credit of command, not from adapting authority, but from discreet use of leadership on operations.

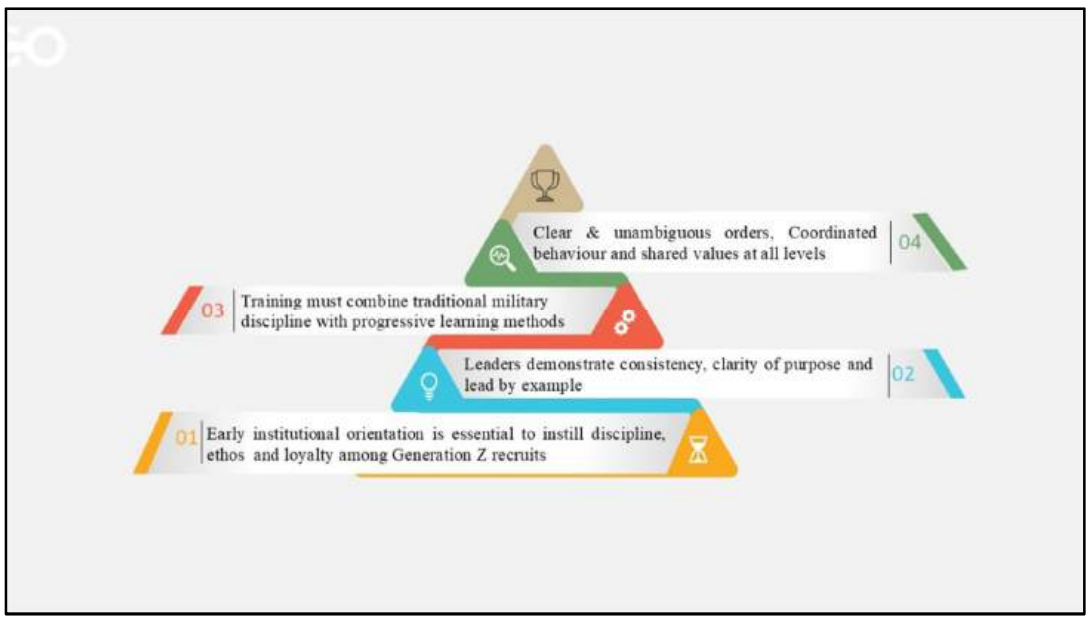
Structured Training and Professional Improvements: Bangladesh Army will have to make a balance between strict adherence to traditional military customs and progressive learning style of freshly recruited members. Physical endurance, discipline, as well as an understanding of tactics attributes that are immediately lacking in civilians as they are now imparted to the military. These disparities appear during initial training and are significantly more pronounced when the troops are working. Recruit training centres, parent units, regimentation periods, unit cycle training (including the cycle ending exercises) and Field Training Exercises (FTX) are the important places where these gaps can be mitigated. A strict structured training, knowledge enrichment sessions, repeated motivation, matured platoon and section commanders' behaviour are the key to improve resilience and proficiency. Also, well-planned and purposeful training helps new members of Generation Z to gain respect, trust and confidence about Bangladesh Army.[30]

Physical Fitness and Combat Readiness: Physical fitness is an important aspect of Bangladesh Army due to its operational engagement in peace and war. To perform the operational responsibility in a professional way a minimum standard of physical stamina, muscular strength and mental determination are required. The challenges are due to an imbalance of physical fitness at the initial stage of military life caused by contemporary living conditions. These weaknesses are soon observed during tough unit training, various operational exercises and during fitness tests. As these generations are highly dependent on technology, unit commanders and junior leaders may teach them digitally about the use techniques of various fitness exercises in gymnasium and also in sainik lines. Unit commanders need to ensure the presence of all members in scheduled training programmes, arrange the special fitness competitions between the companies, weak physical training and motivation on the physical fitness aspects. Therefore, physical fitness is not a training issue which will reduce the generation gaps and enhance the operational effectiveness of Bangladesh Army.

Behavioural Discipline and Organizational Cohesion: Bangladesh Army's senior generations (Generation X/Y) have a long history of traditional military customs. They value discipline and conduct that promote strong teamwork and organizational unity. On the other hand, new military members from Generation Z, behaviour is different when they talk to each other, during learning and while using technology. These differences sometimes make communication harder to comprehend the overall behaviour between command channels and the Generation Z members, but the institutional overall discipline and cohesion remain very strong. The command echelons habit, behaviour and shared beliefs need to be corrected to achieve a conducive work environment. Generation X/Y needs to maintain strict discipline while conducting with

Generation Z, must be clearer while giving any order/ instructions and must set a good personal example in the units. They need to remain strict regarding Bangladesh Army customs and discipline so that new recruit members can learn to respect military customs, discipline and the chain of command. By working like an organ at all tiers will improve behaviour discipline and organizational cohesion will be promoted.

Figure-5: Managing Generation Z as Institutional Responses



Source: Author's self-construct

Conclusion

The integration of Generation Z into Bangladesh Army customs is a long-term organizational transition rather than a short term measures. Present battlefield became more complex with a greater advancement of technology. The Generation Z officers and soldiers can show the signs of cognitive sharpness, expertness on technology which can improve the level of operational efficiency of Bangladesh Army. Failure to control such superiority by professional leadership and institutional frameworks can lead to conflict in a military that values discipline, hierarchy and team efforts. Rather than a change to the military's fundamental values, the goal of this integration is to utilize their experiences in light of societal and technological changes. Maintaining unity among different generations requires having a leadership style that is authoritative yet approachable, consistent in values and that is credible in behaviour. In order to develop discipline, professionalism and ethics of conduct, it is up to the commanding officers and subordinate leaders to emphasize deliberate and tactical training, effective communication and

effective supervision. Modifications to communication, lessons learnt and physical training are to be focused on combat preparedness above and beyond civilian standards. Implementing existing military procedures helps increase resilience, accountability and trust and maintains the integrity of the chain of command. The ability of Bangladesh Army to integrate the Generation Z will have an impact on the army's operational preparedness, human resource retention and organizational stability. Bangladesh Army is competent in harmonizing professional standard with an informed leadership through capitalizing the innovative capacities of the youthful commanders and soldiers of Bangladesh Army while maintaining an operational discipline and cohesion.

Notes and References

1. Jean Twenge, *Gen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy and Completely Unprepared for Adulthood,* New York: Atria Books, 2017, pp. 1–320.

2. Neil Howe and William Strauss, *Millennials Rising: The Next Great Generation,* New York: Vintage Books, 2000, pp. 1–312.

3. Siobhan Kavanagh,'The Impact of Leadership and Change Management Strategy on Organizational Culture,*'European Scientific Journal*, Vol.10, No.7, March 2014, pp. 45-78.

4. Jack Zenger and Joseph Folkman, *The New Extraordinary Leader: Turning Good Managers into Great Leaders,* New York: McGraw-Hill Education, 2019, pp. 65–121.

5. Tim W Smith and Alan Clurman, 'Generational Differences in Leadership: A Meta-Analysis*,' Journal of Leadership Studies*, 2010, pp. 34–47.

6. Sean T Lyons, 'Generational Differences in the Workplace: A Review of the Evidence and Directions for Future Research,' *Journal of Organizational Behaviour*, 2012, pp. 1–26.

7. Jennifer J Deal et al, 'Millennials at Work: What We Know and What We Need to Do,' *Journal of Business and Psychology*, 2010,pp. 191–199.

8. Jane Sturges, et al, 'A Longitudinal Study of the Relationship Between Career Management and Organizational Commitment Among Graduates in the United Kingdom,*' Journal of Organizational Behaviour*, 2005, pp. 1005–1025.

9. David L Eubanks and David R Brown, 'A Review of Generational Diversity Research in the Workplace,*' Journal of Organizational Culture, Communications and Conflict*,2016, pp. 1–17.

10. James H Dulebohn and Laura Werling, 'Early Career Trends Among U.S. Army Officers,' *Armed Forces & Society*, 33(3), 2007, pp. 135–156.

11. Julia M Jones, 'Digital-Age Soldiers: Technology, Learning Styles and Military Training,' *Journal of Military Learning*, 1(1), (2017). pp. 24–38.

12. Larry D Rosen, 'The Impact of Technology on Youth: The Good, the Bad and the Unknown,' *Pediatrics,* 132(3), 2013, pp. 377–386.

13. William Kremer, 'Communication Patterns Across Generations in High-Reliability Teams,' *International Journal of Cross-Cultural Management*, 19(2), 2019, pp. 115–134.

14. Matthew Johnson and Alvaro Lopes, 'Resilience and Mental Health in Modern Militaries,' *Military Behavioural Health*, 8(1), 2020, pp. 29–40.

15. Santa Monica, CA, *Preparing for the Changing Character of War,* RAND Corporation, 2018, pp. 30- 34.

16. 'NATO Allied Command Transformation,Developing Adaptive Leaders for Future Operation,' *NATO ACT Report*, 2019, pp. 20- 25.

17. U.S. Army War College, *Human Dimension Strategy 2020–2040,* Carlisle, PA, 2020, pp. 40- 45.

18. *The Future Soldier: Training, Leadership and Cognitive Adaptability,* Australian Defence College, Canberra Press, 2017.

19. Pew Research Center, *Defining Generations: Where Millennials End and Generation Z Begins,* 2019.https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/. [HTML].

20. Gallup, *How Millennials Want to Work and Live*, 2018, https://www.gallup.com/workplace/238073/ millennials-work-live.aspx [HTML]

21. **'**What Generation Z Wants from Work, Charted Across the World,' *Harvard Business Review*, 2017. [HTML].

22. Forbes, *The Top Leadership Trends Every Soldier Should Know*, 2020.

23. Brookings Institute,*How Technology Is Shaping the Future of the Military*,2019.

24. *Generational Shifts in Military Values*, Global Public Policy Institute, 2019.

25. 'Generation Z in Uniform: What the Military Needs to Know,' *Military Times*, 2021.

26. Atlantic Council, *Digital Natives in the Ranks: Challenges & Opportunities*, 2020.

27. International Organization for Standardization, *Human Capital Reporting Guidelines,* 2018.

28. Discussion with Lieutenant Colonel Sujal Kundo, Commanding Officer, 27 Bangladesh Infantry Regiment on 03, 05, 07 January 2026.

Brief Biography

Lieutenant Colonel Forhad Ahmed, psc, Artillery was commissioned with 58th Bangladesh Military Academy (BMA) Long Course on 18 June 2008 in 19 Medium Regiment Artillery. He served in 8 Field Regiment, 15 Field Regiment, 3 Field Regiment and as Officer Commanding in 33 Field Intelligence Unit. Apart from discharging his duties in all regimental appointments at various capacities, under blue helmet he served as Platoon Commander and as Chief Open-Source Intelligence (U-2) Staff Officer at Force Headquarters in UN Peacekeeping Mission Central Africa Republic. He is a graduate from Defence Services Command and Staff College (DSCSC), Mirpur. He has also obtained his Master of Social Science in Security Studies from Bangladesh University of Professionals. Presently, the officer is serving as Instructor Class A in JCO NCO Academy, Bogura Cantonment.

Fostering a Culture of Innovation in Bangladesh Army: Training Approach Focused on Creativity

Major Md Asiful Islam Khan, Infantry

Abstract

The article supports the development of innovative culture in Bangladesh Army by incorporating a Creativity-focused Training Approach (CFTA) in the training of Infantry Battalion. It first examines the role of innovation in Bangladesh Army, describing components of CFTA such as problem solving, role playing, leadership support, collaboration and creativity tools and how this foster innovation, initiative and a supportive culture. The author analyses current training methods and identifies gaps such as hierarchical rigidity, over-reliance on doctrines, cognitive gaps, fear of failure and resource shortages. Based on the results obtained from these findings, it is proposed strategies for introducing the CFTA integration, such as the cultural changes (leadership support, delegation and creativity), exercise reform (creative modules, uncertainty training, competitions and flexible doctrines) and a two-year implementation plan.

Keywords*: Creativity-focused Training Approach, Cultural Changes, Exercise Reform, Military Training Directorate.*

Introduction

Modern military operations are increasingly volatile, uncertain, complicated and ambiguous. This complexity requires armed forces in the world to learn how to adjust quickly and reason creatively when dealing with the unpredictable challenges. The conventional military training, which mostly focuses on properly following the doctrines, authoritative hierarchy and standard operating procedures, is less useful in addressing the issues of modern warfare. In particular, strict dogmas emphasizing repetition and predetermined solutions can restrict the capacity of the soldiers to react to unconventional threats. Bangladesh Army is not an exception to this phenomenon. Although Bangladesh Army has been successful in its peacekeeping role, the dynamic nature of the modern warfare particularly in the asymmetrical warfare setting demands a shift in the way the army trains its force.

In the case of Bangladesh Army especially the Infantry Battalions, this innovation and adaptation to the dynamic battlefields is very important. The Infantry Battalions are the heart of Bangladesh Army operations and their capability to react quickly to unforeseen events can play a crucial role in the success of the mission outcome. But the existing training regime in Bangladesh Army revolves around the conventional approaches and this, despite their effectiveness in some contexts, might not provide soldiers with the required level of creativity and improvisatory thinking required to respond to the non-traditional and hybrid threats.

Understanding the Key Elements of a Creativity-Focused Training Approach and Its Correlation with Fostering a Culture of Innovation

Creative Problem Solving and Idea Generation

The training of military creativity is best achieved when based on realistic scenario-based exercises that require participants to think out of the box and be able to adjust to operational complexities. These procedures promote team learning, critical thinking and experimenting and can help officers and soldiers to put academic concepts into field solutions. Survey-1 is another question that was significantly supported by more than 65% of the participants which again highlights the applicability of this practice in enhancing innovation and adaptive thinking in the military organizations.

Role Playing and Simulation Training

Simulation training and role-playing enhance flexibility and creativity among the military personnel. Bangladesh Army has invested a lot in the facilities such as the Army War Game Centre (AWGC), where emphasis has been laid on experiential learning whereby, soldiers and leaders have the opportunity to perfect plans, test strategies and learn through simulated successes and failures without risk.[1] These strategies have several advantages: in addition to training tactical abilities, they are used to develop confidence and resilience that are necessary to be innovative in the real world.[2] The advantages of simulation training in the development of innovation are explained below:-

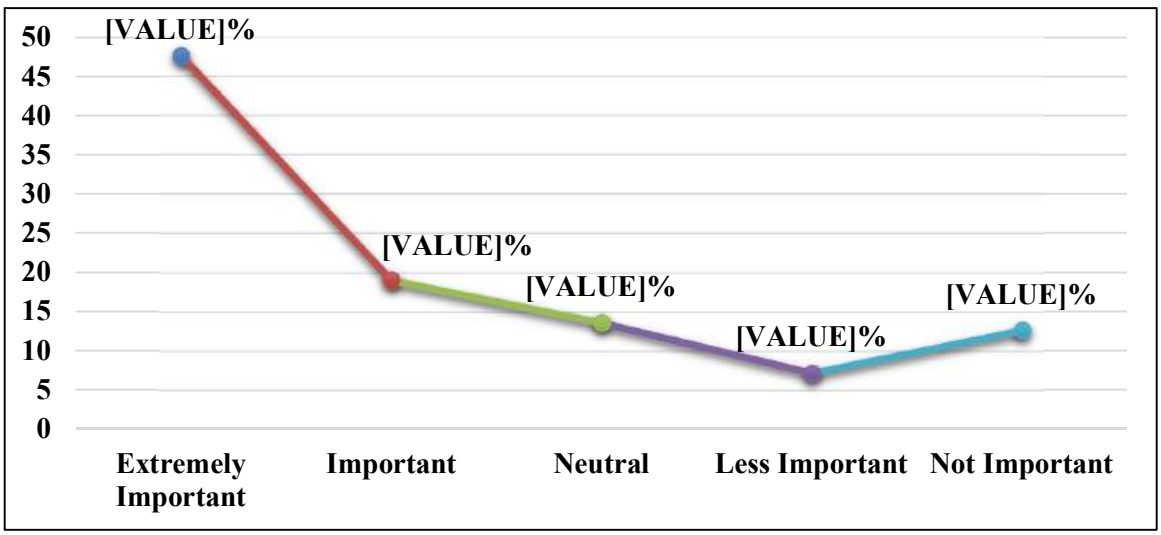
Figure-1: Benefits of Simulation Training in Fostering Innovation Non-traditional and Hybrid Threat

Source: Author's self-construct

Leadership Support and Encouragement

Leadership support and encouragement are essential to the success of innovation. Leaders should be able to balance discipline and creative freedom, offering clear direction while granting autonomy to the team.[3] They can support confidence and innovation by encouraging open discussions, recognising efforts and supporting experimentation. This helps to embed creativity as a core value. More than 61% of respondents in the survey also feel that leadership support is critical to CFTA.

Figure-2: Importance of Leadership Support and Encouragement for a CFTA



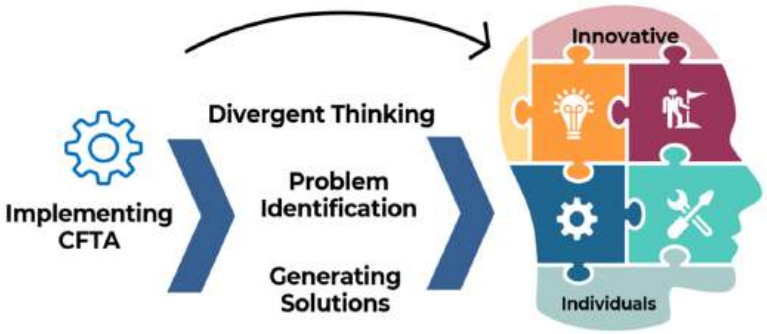
Source: Author's self-construct

Creativity-Focused Training Approach in Fostering a Culture of Innovation

Developing Innovative Individuals

The ability for individual innovation is the basis of an organisational innovation culture.[4]. CFTA provides people with cognitive abilities such as divergent thinking, problem detection, solution formulation and planning. These skills shape attitudes of challenges in a military environment.[5] By exposing personnel to different experiences, fostering reflection and providing opportunities for independent problem solving, Bangladesh Army can cultivate flexible and creative soldiers who are prepared to face the modern challenges in the military. More than 81.9% of respondents said that CFTA will develop innovative military personnel. The process of the development of innovative individuals through CFTA is shown in the Figure:-

Figure-3: Process of Developing Innovative Individuals by a CFTA



Source: Author's self-construct

Empowering Initiative and Effective Decision-Making

CFTA boosts the confidence and competence of the junior leaders thus making them able to take disciplined initiative and make timely decisions.[5] Agility in modern operations requires the abilities to empower initiative at all levels, which is one of the supports of decentralised leadership to improve effectiveness of the mission and build trust and resilience. Encouraging initiative enables Bangladesh Army to use the full potential of personnel and to strengthen adaptability to dynamic problems.[6] This is further confirmed in the survey's findings, with 54.2% of respondents agreeing that CFTA gives members empowerment and helps them make better decisions. How CFTA empowers junior leaders has been explained in the following Figure:-

Figure-4: How CFTA Empowers Junior Leaders

Source: Author's self-construct

Reinforcing Innovation through Culture

Innovation demands a culture that supports it, which is achieved through sharing of experiences, role models and embedding of innovation into the core values.[7] Opportunities to experiment, continual learning and open communication improves the Army's innovation especially when training focuses on creative thinking. Fostering CFTA in the culture of Bangladesh Army can sustain innovation to drive improvement and excellence in a continual improvement process. Over 80% agree that CFTA promotes enforcement of innovation through promoting an enabling culture.

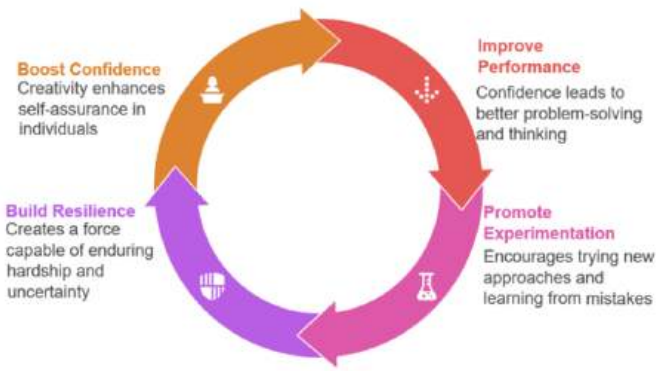
Figure-5: Fostering Innovation in the Army

Source: Author's self-construct

Building Confidence and Resilience

Creativity increases confidence and resilience in an unpredictable scenario. Diverse problem-solving individuals are more confident when faced with unexpected problems and adapting to change. This confidence helps in improving performance through creative problem solving and divergent thinking under pressure, helping the person in the difficult situations.[8] Promoting experimentation and failure helps Bangladesh Army build resilience and enables it to withstand hardship and face uncertainty with ongoing improvement.

Figure-6: Cycle of Creativity and Resilience



Source: Author's self-construct

Quantitative Findings

Correlations

Pearson correlation coefficients for factors like Importance of Leadership Support, Technological Superiority, Command Philosophy, Efficiency, Management, Quick Decision-Making and Warfare Trends (N=334). Some are significant at $p < 0.05$ (*) or $p < 0.01$ (**), as shown in Table-2, which displays these results via bar charts of coefficients, significance and metrics.

Table-1: Pearson Correlations

		Importance of Leadership Support	Importance of Achieving Tech Superiority	Importance of Bridging Command Philosophy	Importance of Efficiency	Importance of Management Assignments	Importance of Quick Decision-Making	Importance of Adaptation to Warfare Trends
Importance of Leadership Support	Pearson Correlation	1	-.006	-.119*	.136*	-.108*	.105	.292**
	Sig. (2-tailed)		.910	.029	.013	.048	.054	.000
	N	334	334	334	334	334	334	334
Importance of Achieving Tech Superiority	Pearson Correlation	-.006	1	.475**	.163**	.384**	.627**	.465**
	Sig. (2-tailed)	-.910		.000	.003	.000	.000	.000
	N	334	334	334	334	334	334	334
Importance of Bridging Command Philosophy	Pearson Correlation	-.119*	.475**	1	.291**	.505**	.423**	.460**
	Sig. (2-tailed)	.029	.000		.000	.000	.000	.000
	N	334	334	334	334	334	334	334
Importance of Efficiency	Pearson Correlation	.136*	.163**	.291**	1	.441**	.272**	.540**
	Sig. (2-tailed)	.013	.003	.000	.000	.000	.000	.000
	N	334	334	334	334	334	334	334
Importance of Management Assignments	Pearson Correlation	-.108*	.384**	.505**	.441**	1	.378**	.456**
	Sig. (2-tailed)	.048	.000	.000	.000	.000	.000	.000
	N	334	334	334	334	334	334	334
Importance of Quick Decision-Making	Pearson Correlation	.105	.627**	.423**	.272**	.378**	1	.478**
	Sig. (2-tailed)	.054	.000	.000	.000	.000	.000	.000
	N	334	334	334	334	334	334	334
Importance of Adaptation to Warfare Trends	Pearson Correlation	.292**	.465**	.460**	.540**	.456**	.478**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	334	334	334	334	334	334	334
* Correlation is significant at the 0.05 level (2-tailed).								
** Correlation is significant at the 0.01 level (2-tailed).								

Source: Author's self-construct

Table-2: Descriptive Statistics for the Importance of CFTA Elements and Fostering Innovation

Variables	Mean	Standard Deviation
Importance of Creativity Training	3.36	0.71
Importance of Leadership Support	3.82	1.42
Importance for Achieving Technological Superiority	4.34	0.63
Importance for Bridging Upper and Lower Tier Command Philosophy	4.12	0.60
Importance for Efficiency in Administration and Resource Management	4.32	0.69
Importance for Management of Varied Assignments	4.11	0.64
Importance for Quick Decision-Making	4.27	0.66
Importance for Adaptation to Changing Trends of Warfare	4.51	0.69

Source: Author's self-construct

Interpretation

The data indicate moderate recognition of the role of creativity training in innovation, with a strong emphasis on leadership support for the implementation and sustainability of CFTA. Innovation is valued for its strategic adaptation, technological advantage and operational efficiency, aligning with theories on the influence of leadership.

Extent of Creative Training in the Infantry Battalions of Bangladesh Army – Current State and Gaps for Fostering Innovation

Global Military Studies on Creative Training

The United States (US) Army has been engaging in adaptive leadership and decentralised decision-making in Infantry Battalions through scenario-based training and simulations that challenge soldiers to solve complex problems under pressure. The Army's Mission Command programme allows junior leaders to use their initiative to develop creative thinking and the ability to adapt to changes in the course of field exercises and simulations.[9] The US Army has regarded innovation as one of the five basic skills of army leaders, where a focus is placed on creative problem-solving and the production of novel ideas in response to unexpected situations.[10] The military creative problem-solving framework is shown as follows:-

Table-3: Comparative Study of Different CFTAs of the Contemporary Armies

Military	Creative Training Approach	Key Outcomes
United States Army	A narrative creativity curriculum with scenario-based exercises and narrative thinking modules for all ranks	Improved creative problem-solving with gains in novelty, suitability, feasibility, adaptability and strategic thinking
British Army	Innovation through technology integration, including the Army Warfighting Experiment and the rapid deployment of new equipment for user feedbak	Accelerated modernization, improved adaptability and enhanced operational effectiveness through new technologies and international collaboration
Indian Army	Grassroots innovation platforms like Inno-Yoddha promote in-house solutions, competitions and new training methods and technologies	Enhanced operational efficiency, ongoing development of capabilities and acknowledgment of creativity as crucial to strategy and preparedness
Pakistan Army	Multinational team exercises (e.g., Team Spirit) share innovative ideas in challenging environments	Improved combat skills, increased international cooperation and better adaptability through the sharing of innovative operational techniques
Malaysian Army	Promote creativity, support leadership, collaborate with higher education and host events like Innovation Day to showcase ideas. Use of VIRTSIM	Improved effectiveness and efficiency, fostering "thinking soldiers" and a culture of continuous improvement and adaptability despite resource constraints.

Source: Author's self-construct

Training System for Bangladesh Army: A Synthesis for Infantry Battalion

Infantry Battalion training follows the Formation Training System (FTS) within a division, involving soldiers, NCOs, JCOs and officers.[11] Each group has a role-specific system, but current methods limit creativity. The FTS of Bangladesh Army is evolving and dynamic, as shown in the comparative Table-4:-

Table-4: Comparative Study on the Training Systems for an Infantry Battalion

Components of FTS-2020		Key Features	Structure	Training Levels/ Participants	Scope of Creativity	Challenges for Innovation
Individual TT System-2016		- Revised in 2016 - Two streams: Trade & Leadership - Focus on individual skills and leadership	- Trade: Basic & Advanced - Leadership: Commando, Promotion, and CLM Cadre	- Trade: BTT, ATT for Sainik and Corporal - Leadership: NOC, Sergeant, WO	- There is limited creativity in trade modules; however, leadership courses provide some opportunities for adaptive thinking and initiative	- Inflexible curriculum; time and resource limitations; emphasis on compliance rather than experimentation; absence of innovative assessment frameworks
Subunit GPT System 2020	Aspects of GPT (Incl (IT, GPT)	- Reintroduced in 2020 - Focus on integrating individual skills into collective performance	- Refresher training - MOOTW - Cycle Ending Exercise	- Individual (from sainik to officer) - Subunit Group Training replaces unit training	- Increase focus on mission-oriented, practical exercises; group tasks encourage teamwork and problem-solving	- Balancing standardisation with flexibility; limited time for creative exercises because of given operational objectives
	WT	- Focus on major operations - Combination of formation and Army-level training	- Subdivided into unit, brigade and formation levels	- Major operations practiced - Individual (from sainik to officer)	- Potential for creative strategies in large-scale exercises, although typically within doctrinal limits	- Resource-intensive, logistical complexities and a tendency to repeat established scenarios
	ST	- Focus on minor operations - All available soldiers participate	- Battalion level	- Activities: raid, ambush, patrol and other minor operations - Individual (from sainik to officer	- Small group operations enable improvisation and adaptive leadership	- Short duration; restricts opportunities for sustained creative development

Source: Author's self-construct

Barriers to Fostering Innovation in the Current Training Approach

Hierarchical Rigidity

While the military's hierarchy promotes discipline and command, it can hinder creativity. Top-down decisions, a rigid chain of command and strict authority often deter lower-level leaders from suggesting nonstandard ideas or labouring against norms.[12] This inflexibility is evident during infantry battalion training when the possibility of failing to adhere to protocols could

restrict experimentation and seeking alternatives.[13] The outcome of Survey-1 on hierarchical rigidity is as depicted below with over 91% mentioning hierarchical rigidity as a barrier to CFTA.

Over-Reliance on Doctrine, SOP, TTP and Checklists for Training

The military organisation has a large number of Standard Operating Procedures (SOPs) and regulations to ensure a high level of conformity. The reason for the military having SOPs, regulations and doctrine is in order to have control over the manner in which people and organisations act, not to tolerate deviations from the tried and tested.[14] In addition, during FGD-2, the participants also explained how absence of organisational culture that supports creativity due to a sceptical mindset, conformity as a practice and overdependence on TTP reduces creativity.[15]

Cognitive Differences between Officers and Under Commands

An important training gap in the present is the creatively thinking gap between officers and their under commands (NCOs, JCOs, Soldiers). Officers acquire creative abilities in courses on initiative, flexibility and innovation.[16] In contrast, Under Commands (UCs) are trained in a practical manner focused on drill and execution rather than innovation. This develops an intellectual hierarchical structure: officers are planners and problem-solvers and subordinates are doers. This divergence can impede communication, understanding and collaborative innovation.[17]

Fear of Failure and Risk Aversion

Fear of failure in military training leads to a lack of innovation in Infantry Battalions. High stakes result in a zero-tolerance approach, causing criticism, rigidity and risk aversion.[18] Innovation involves risk; Battalion Commanders are often more interested in achieving success and nipping problems in the bud and not learning from failure. This lack of psychological safety is a hindrance to creative thinking and innovation. A cultural change is far-reaching as it is necessary to change the risk aversion that still limits soldiers' ability to innovate.[19]

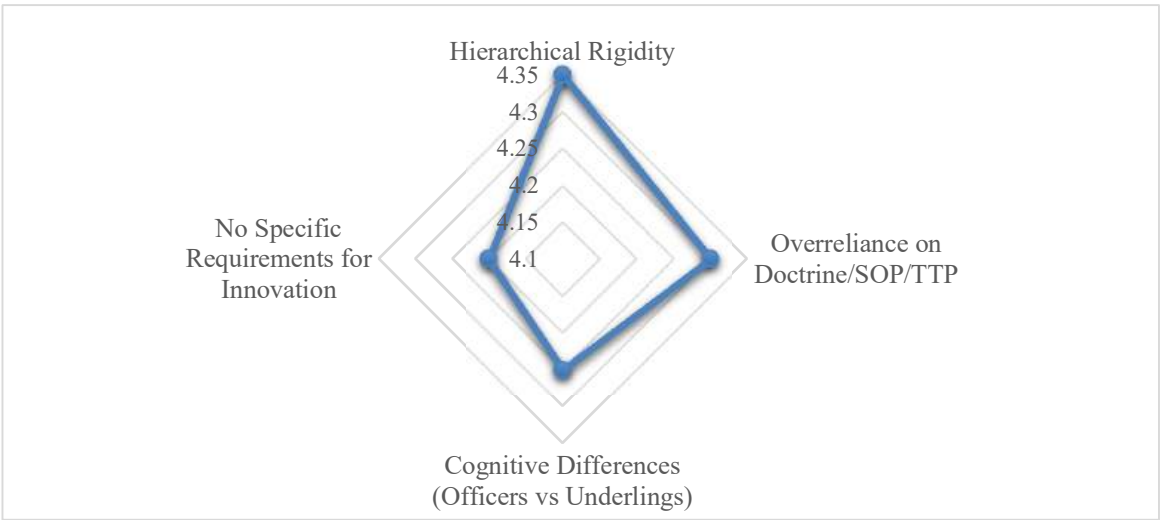
Dependence on Previously Followed Exercises, Training and Lessons

Training in Infantry Battalions is largely based on repetitive exercises and this inhibits adaptation and innovation. While these drills are good for the skills, if they are overused, they may be limiting adaptive thinking and response to new challenges.[20] Commands prefer what has worked, they prefer routines and practises of what has been done before and are often more invested in tradition than change, leading to what can be called ‘institutional memory’ which is detrimental to being able to adapt in fast-changing environment. UC only trained on seen-before situations can have trouble with unprecedented challenges that require creative problem-solving.[21]

Quantitative Findings

Figure-7 supports the barrier to innovation by illustrating that out of 4 barriers, namely; "Hierarchical Rigidity", "Overreliance on Doctrine/SOP/TTP," "Cognitive Differences," and "No Specific Requirements for Innovation," Hierarchical Rigidity is more outward-inclined compared to others.

Figure-7: Barrier to Innovation



Source: Author's self-construct

The analysis shows that current infantry training places little emphasis on creativity, with low scores for innovation (2.60) and scenario-based problem-solving (2.72). Major barriers include over-reliance on doctrine and SOPs (4.45) and the absence of formal innovation requirements (4.45). Hierarchical rigidity (4.30) and fear of failure (4.21) further discourage initiative and experimentation. Overall, the findings highlight critical gaps where rigid structures and risk aversion undermine efforts to build an innovative training culture.

Impact of CFTA

The correlation matrix shows a Pearson coefficient of 0.42 between the Importance of CFTA and the Innovation Culture Score. This indicates a moderate positive relationship, meaning that higher value placed on CFTA is linked to stronger prioritisation of innovation. The result is statistically significant, highlighting that fostering creativity through training is closely associated with developing an innovative organisational culture.

Table-6: Correlation Matrix

Variables	Importance of Creativity Training	Innovation Culture Score
Importance of Creativity Training	1.00	0.42
Innovation Culture Score	0.42	1.00

Source: Author's self-construct

Viable Strategies for Integrating CFTA into Bangladesh Army Infantry Battalions' Existing Training Approach

Leadership Support and Encouragement

Leadership is significant in the creation of an innovative culture as highlighted earlier. In order for CFTA to be successful, it is necessary for Battalion Commanders and senior officers to encourage open communication, support new ideas and create a psychologically safe space for experimentation.[22] Leadership training should focus on creativity and incorporate best practices such as the U.S. Army's Mission Command, which gives junior leaders the ability to make decisions.[23] By demonstrating creativity in problem-solving and rewarding innovation, leaders can transform overall organisational culture fostering adaptability and flexibility.

Enhancing the Cognitive Domain of UC by Professional Enrichment

The cognitive gap between officers and UCs has been cited as a major impeding factor to innovation.[24] CFTA based training can fill this gap by enhancing UCs' abilities to think critically, solve problems and adapt. Scenario-based workshops and design thinking exercises will help UCs to think more exhaustively out-of-the solution and help to understand the mind of leaders more accurately. Moreover, during crises, UCs will be more confident to accomplish the mission with their innovative solutions. Survey results also validate the idea that more creative thinking will result if the cognitive skills of the UCs are improved.

Ensuring Mission Command for Fostering Innovation

Mission Command encourages decentralised decision-making, minimising reliance on hard set doctrine in training. Delegating authority to junior leaders promotes flexibility and creativity in complex situations. FGD-1 participants added that strict command is a suppressant of initiative while Mission Command promotes innovation. Applying this in Sub-unit GPT with the freedom in tactics and training with uncertainty is essential for breeding trust and innovation in infantry battalions.

Conducting Training under Uncertainty by Altering the Established Pattern

By changing established patterns through conducting training under uncertainty, the overreliance on doctrine and repetitive drills can be decreased through exposure to realistic problems. Introducing some dynamic and unpredictable elements into Sub-unit GPT and OGT, such as sudden mission changes or incomplete intelligence, requires leaders and soldiers to think outside the set procedures and adapt through judgement and initiative.[25] The use of real-time wargaming by the Indian Army is yet another example of how unpredictable training environments promote adaptability, innovation and operational agility.

Arranging Cross-functional Teams, Sub-units and Unit-level Creative Competitions

The diversity of opinion in a team across functions increases problem-solving and creativity.[26] Tactical innovation competitions for sub-unit and battalion levels which are inspired by Indian Army's Inno-Yoddha 2024-25 encourage collaborative innovation. These events allow the officers, JCOs and soldiers to solve tactical issues as a group that brings teamwork and cooperation across the ranks.[27] The sharing of successful strategies increases cohesion; while addressing unit-level innovation issues results in practical and field-ready solutions.

Making Doctrine, SOPs and TTPs More Flexible

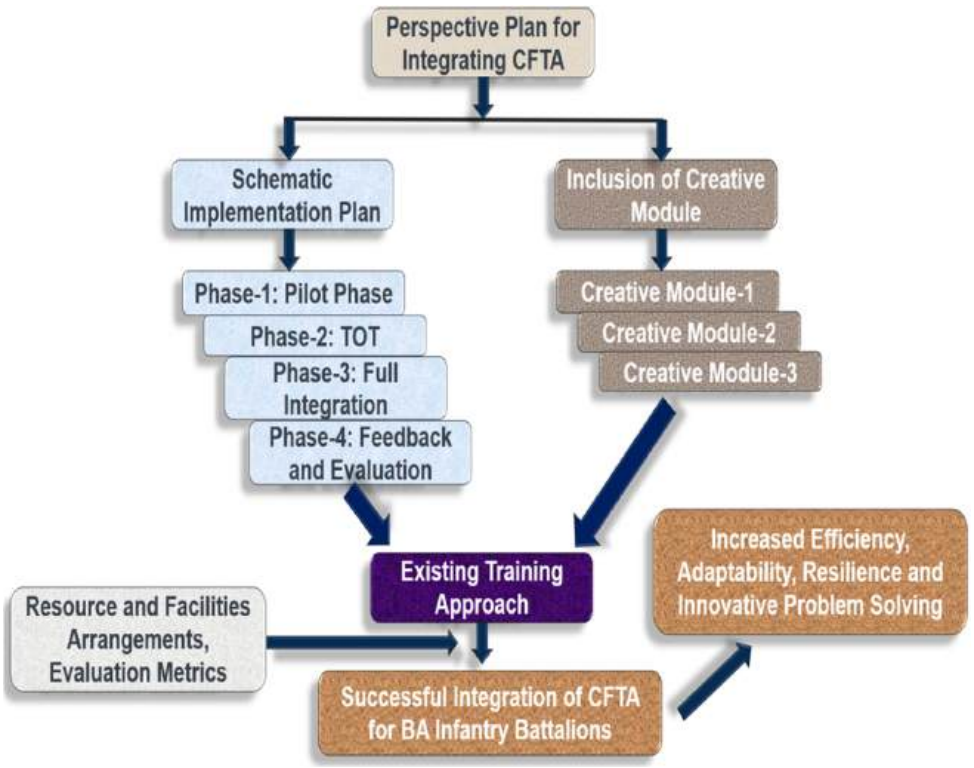
Over-reliance on doctrine, SOPs and TTP is a constraint on creativity in Bangladesh Army training. For the benefit of the CFTA, the doctrine should be revised to accommodate more flexibility and innovation without compromising the effectiveness of operations. Commanders should also modify their respective SOPs according to the requirements of the situation and based on scenario-based training practises in contemporary armies.[28]

Perspective Plan for Integrating CFTA into the Existing Training System

Schematic Implementation Plan

A well laid out plan will provide for a better understanding and integration of the CFTA within the FTS of Infantry Battalions. Designed to comply with strategies mentioned previously, it emphasizes key CFTA features, while addressing current training challenges. The phased approach ensures scalability, sustainability and measuring outcomes within 24 months with clear objectives, timelines and evaluation mechanisms. Effective CFTA integration requires changes in approach to training in a systematic way and the inclusion of a creativity module in programmes.

Figure-8: Schematic Implementation Plan for CFTA in Infantry Battalions



Source: Author's self-construct

Change in Training Approach

The CFTA implementation is planned over 24 months in four phases for gradual integration. Phase one is pilot testing with surveys and focus groups to refine training modules. Next, a Training of Trainers (TT) programme develops a skilled instructor base to maintain the initiative. This is then followed by the full integration into curricula and appraisal systems with regular assessments to adapt to emerging threats. Essential resources advanced equipment, certified instructors and analytical tools are reviewed for their effectiveness in stimulating innovation and operational resiliency.

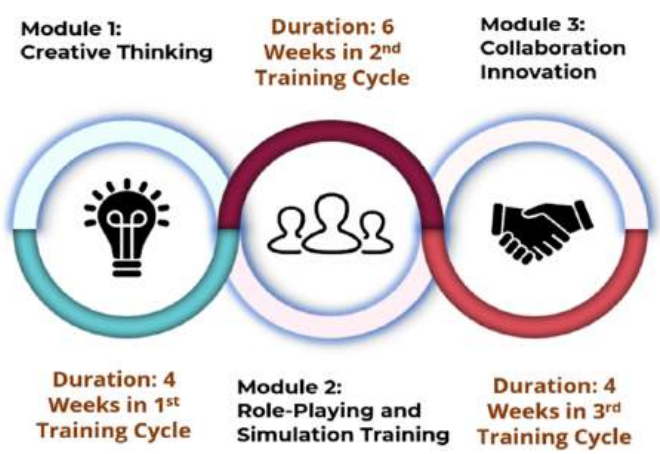
Figure-9: Time Phase Line for Implementing CFTA

Source: Author's self-construct

Inclusion of Creative Module in Training Programmes

A new creative training module will be embedded into the FTS in order to strengthen innovation. The first module will help building the ability for innovative thinking and divergent problem-solving in workshops and scenario analysis. The second one will be focusing on adaptability with role-playing, real-life case study and virtual reality simulations. The third module will promote team-based innovation and interactions across ranks through cross function competitions.

Figure 10: Duration of Creative Module in Training Programmes



Source: Author's self-construct

Conclusion

Bangladesh Army is faced with increasing hybrid threats that require innovation beyond training that is doctrine-heavy, such as the FTS. Although it has been successful in the past, like in the Liberation War in 1971, reflects the capacity of Bangladesh Army for unconventional tactics, limited reforms since 2020 have left operational gaps as compared to modern armies like the US and UK. Study into the components of CFTA such as problem solving, simulation, leadership, teamwork and tools through surveys and FGDs revealed high support for improving creativity, agility and decision-making. Over 87% of the respondents emphasised the importance of innovation, making it an urgent need for systematic integration in order to meet the modern challenges.

Gap analysis uncovered barriers such as hierarchy, doctrinal rigidity, fear of failure and resource constraints which curtail creativity despite doctrinal sanction for unorthodox approaches. Study suggested scenario-based exercises, mission command, flexible doctrines, competitions and simulations to encourage adaptability and efficiency. Implementation is planned in terms of cultural change, training redesign and pilot programmes in a phased 24-month approach and positive effects confirmed by Eliminate Reduce Raise Create (ERRC) validation and Statistical Package for the Social Sciences (SPSS) correlation (Pearson r = 0.42).

Recommendations

- Based on the findings of this article, the following are recommended in the integration of CFTA in the existing training system of Bangladesh Army Infantry Battalions:-

- The Army Training and Doctrine Command may perform a feasibility study by June 2026 on comparing and proposing changes to the course and cadre curricula especially for the recruit centres to ensure the principles of the CFTA are embedded in the training programmes at the early stages to promote creativity from an institutional point.

- The Military Training Directorate can revise the existing promotion criteria for UC.[29] By June 2027 and suggest any changes needed for leadership development cadres to reward creativity based on merit, according to the timeframes and measurable criteria described in the study.

- The Infantry Directorate may pick up two Infantry Battalions by October 2027 and supervise proposed CFTA modules that bring creative thinking to existing FTS, including IT and GPT, as outlined in the analysis in the study.

- A dedicated simulation training facility in each Infantry Division, equipped with advanced tools like virtual reality and scenario-based simulators, may be established by December 2027 to prepare personnel for emerging battlefield environments, including hybrid threats and asymmetric warfare.

- Cross-functional competitions and adaptive scenario-based exercises on battalion level, with the guidance of ARTDOC, can be organised starting from the first year of implementation i.e. by 2028 detail assessments to be made by the third year in order to increase the efficiency under uncertainty.

Notes and References

1. Interview with Major General Shakil Ahmed, BSP, SPP, BGBM, nswc, afwc, psc (LPR) Ex-General Officer Commanding of 19 and 66 Infantry Division, Commandant of School of Infantry and Tactics taken on 02 May 2025.
2. Harry Sowry, 'Doctrine vs Creativity: Is Creative Thinking Inhibited in Early Military Training*?' Journal of Military Studies,* Australian Army, 2021.
3. Interview with Brigadier General Mohammad Mohtashim Hyder Chowdhury, ndc, afwc, psc Director, Infantry Directorate, Army Headquarters taken on 28 May 2025.
4. Interview with Lieutenant General Mizanur Rahman Shameem, BP, OSP, BAM, ndc, psc (LPR) Chief of General Staff, Army Headquarters taken on 03 August 2025.
5. Interview with Major General A S M Ridwanur Rahman, awc, afwc, psc, G, General Officer Commanding of 17 Infantry Division taken on 15 June 2025.
6. Interview with Brigadier General Md Humayun Kabir, SUP (BAR), SPP, psc Director, Military Training Directorate, Army Headquarters taken on 18 June 2025.
7. FGD-2 Former and Present Company Commanders, Infantry Battalions, dated 15 June 2025, online (Zoom).
8. FGD-3 Personnel Involved in Training, Infantry Battalions, dated 18 June 2025, 4 BIR Conference Room.
9. Maria-Lucia Rusu, *The military organisation – A culture of innovation,* Land Forces Academy Review, 2023.
10. *US Army Doctrine Reference Publication* 6-22, 2012.
11. Interview with Major General AKM Nazmul Hasan, BGBM, ndc, psc, (LPR) ex-General Officer Commanding of 7 Infantry Division taken on 03 May 2025.
12. Interview with Lieutenant General Mizanur Rahman Shameem, *op. cit*.
13. FGD-1 Former and Present Company Commanders, Infantry Battalions, dated 30 May 2025, online (Zoom).

14. Charles D. Allen, *Creative Thinking for Individuals and Teams*, U.S. Army War College, 2009.

15. FGD-2, *op. cit.*

16. Interview with Lieutenant General Mizanur Rahman Shameem, *op. cit*.

17. FGD-2, *op. cit.*

18. Interview with Major General Shakil Ahmed, *op. cit.*

19. FGD-1, *op. cit.*

20. FGD-2 and FGD-3.

21. Interview with Major General A S M Ridwanur Rahman, *op. cit.*

22. FGD-1, *op. cit.*

23. Maria-Lucia Rusu, *op. cit.*

24. FGD-2, *op. cit.*

25. Interview with Lieutenant General Mizanur Rahman Shameem, *op. cit*.

26. Ian Roxborough, 'Organisational innovation: Lessons from military organisations,' *Journal of Strategic Studies*, USA, 2017.

27. FGD-2, *op. cit.*

28. Interview with Lieutenant General Mizanur Rahman Shameem, *op. cit*.

29. MOQ, Army Training and Doctrine Command, Bangladesh, 2022.

Brief Biography

Major Md Asiful Islam Khan, Infantry was commissioned with 71st Bangladesh Military Academy (BMA) Long Course in the Corps of Infantry. He is a graduate of Bangladesh University of Professionals. Apart from his mandatory courses, he attended the Basic Para Course, the Potential Platoon Commander's Course, the International Urban Operations Instructor Course in the United Kingdom and the Junior Staff Course and Mid-Career Course in Pakistan. He is a parent officer of 'Ajeo Char'. Moreover, he served under the blue helmet as Platoon Commander and Assistant Operations Officer of a Contingent in Central African Republic. He served as the Platoon Commander (Instructor Class B) in Bangladesh Military Academy. Additionally, he served as Staff Officer Grade-2 (Operations Officer) of the Overseas Operations Directorate, Army Headquarters. He is a graduate of Defence Services Command and Staff College, Mirpur. Presently, he is serving as one of the Company Commanders of 'Auditiyo Dui' in Chattogram Hill Tracts.

Incorporating Agentic Artificial Intelligence in Bangladesh Army: Opportunities, Challenges and Ways Forward

Major Ausiuddin Aftab Abir, psc, Infantry

Abstract

Rapid technological advancement has transformed the character of modern warfare which is now shaped by use of artificial intelligence, autonomous systems, cyber, and electronic warfare. Among these, Agentic artificial intelligence is a significant development which can reason, analyse, learn, and support decision-making with minimal human intervention. This paper examines the relevance of Agentic artificial intelligence for the Bangladesh Army and evaluates its potential applications, risks, and requirements for responsible integration. The study explores its role in intelligence, surveillance and reconnaissance, the military decision-making process, training and doctrine development, combat service support, and enhancing autonomous weapon systems. The paper also identifies key challenges that include accountability in decision-making, cyber-security risks, infrastructural limitations, and risk of over-reliance on autonomous systems. To address these challenges, a phased integration approach of Agentic artificial intelligence is proposed. The paper emphasises the need to develop artificial intelligence literacy, strengthen cyber-security, and establish clear doctrinal, legal, and ethical guidelines with strict human-in-the-loop frameworks. It concludes that Agentic artificial intelligence can act as a force multiplier for the Bangladesh Army if guided by human judgment, command responsibility, and military ethics.

Keywords*: Artificial Intelligence, Agentic Artificial Intelligence, Protection of Civilian, Surveillance and Reconnaissance, Military Decision-Making Process, Human-in-the-Loop, Autonomous Weapon Systems, Combat Military Ethics.*

Introduction

Over the past few decades, technological advancement has profoundly transformed human civilisation and reshaped the cognitive process. This progress now affects all spheres, from social interaction to national governance. At the same time, technology strengthens national security by modernising military capabilities. The latest development is Agentic Artificial Intelligence (AI) which goes beyond traditional autonomous systems. This new AI can redefine decision-making, operational planning and battlefield management.

Warfare has evolved rapidly in the past century. It has shifted from conventional force-on-force confrontations to technology driven battle that integrates AI, autonomous systems, cyber operations and information warfare. Bangladesh Army poses a great opportunity in incorporating Agentic AI to enhance its operational planning capabilities, Military Decision-Making Process (MDMP), ensuring secure combat service support and combatting nontraditional security threats. Though there exists some challenges in terms of infrastructure, financial investment and efficient

human resource, Bangladesh Army can bring up concerted efforts to overcome the challenges and reap the full potential of incorporating Agentic AI.

At this backdrop, this paper will initially highlight the key differences between the concept of Agentic AI and traditional AI. Subsequently, it will discuss the importance of Agentic AI in the military domain. Later, it will comprehensively examine the opportunities that Agentic AI can potentially deliver to Bangladesh Army. Thereafter, it will discuss the challenges faced by Bangladesh Army in implementing Agentic AI. Finally, the paper will put forward few plausible measures for effectively incorporating Agentic AI into Bangladesh Army.

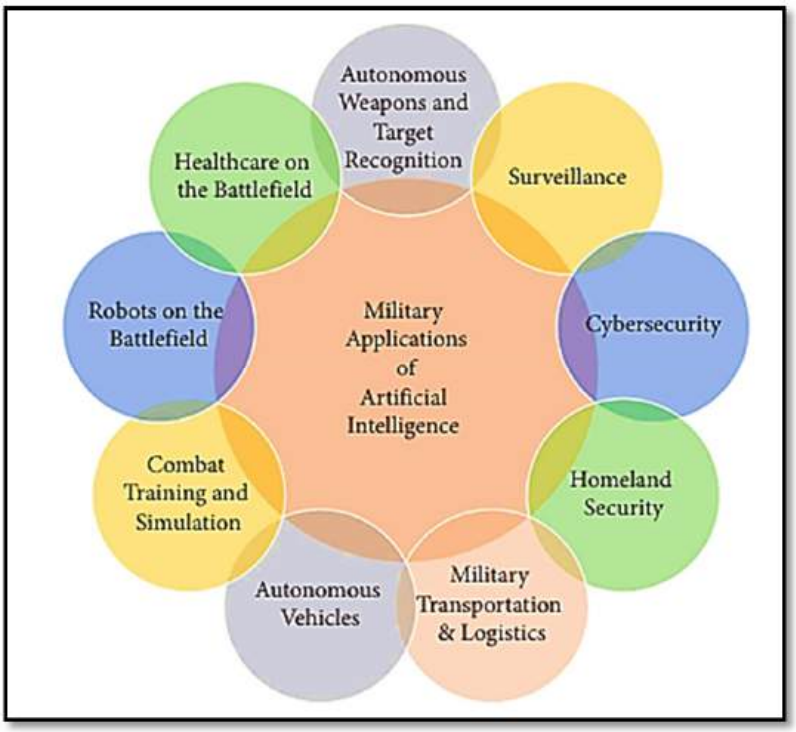
Key Difference between AI and Agentic AI

Traditional AI systems (commonly known generative models like ChatGPT) react to inputs with pre-programmemed logics or pattern-based generations. For example, generative AI models like ChatGPT or Gemini can produce images when inputs or 'prompts' are fed. In contrast, Agentic AI refers to systems that proactively pursue goals with minimum supervision. Agentic AI builds on generative systems by using Large Language Models (LLMs) as its reasoning engine. LLM acts as the brain that provides context and reasoning, while the agentic layer adds planning and memory to transform that intelligence into goal-directed action. When given a complex task, Agentic AI autonomously sets a plan, breaks down objectives into steps, calls the right tools or sub-agents and uses memory to stay on track until it completes the job.[1] This 'agentic' nature is inherently suitable for complex and high-risk jobs such as military, space research and complex industrial production.

Agentic AI and Its Military Significance

The emergence of Agentic AI represents a paradigm shift in how we conceive traditional AI and autonomous systems and their roles in various fields in the military. The technology's appeal lies in its ability to process vast amounts of information, coordinate complex operations and execute plans with a speed and precision that human operators cannot match.[2] Agentic systems can independently plan, adopt to changed circumstances and coordinate multiple complex actions without human oversight. This involves a wide range of critical tasks including surveillance, decision-making, simulation and logistics. Agentic AI has also changed the concept of superior force in battlefield and revolutionised asymmetric warfare. The recent Ukraine-Russia and Hamas-Israel conflicts are examples of various degrees of application of Agentic AI. The rapid development in this field now necessitates every country to incorporate Agentic AI in its military to remain relevant in the modern world. Few of the prominent uses of AI in the military are shown in Figure-1 below:

Figure-1: Applications of AI in the Military



Source: Rashid, 2023

Opportunities for Bangladesh Army in Incorporating Agentic AI

Enhance Intelligence, Surveillance and Reconnaissance (ISR) Capabilities: Agentic AI-based systems incorporated in the ISR assets like airborne sensors and ground radars, will enhance their capability to detect, analyse and forecast threats without human intervention. Bangladesh Army may employ autonomous systems to detect and track High Value Targets (HVT), identify possible threat buildup and forecast natural calamities with accuracy. Besides, Agentic AI-enabled 'predictive intelligence' can increase readiness and response of Bangladesh Army in Chattogram Hill Tracts (CHT), United Nations Peacekeeping Operations (UNPKO) and in disaster management. The United States Department of Defence (DoD) has *Project Maven,* which is an AI-enabled Geographical Intelligence (GEOINT) programme that analyses massive amounts of imagery and data collected from multiple ISR assets, to automatically detect, identify and attribute features and objects.[3] The Chinese People's Liberation Army (PLA) has also integrated generative AI models, including *DeepSeek AI* for intelligence tasks, report generation and processing of Signal Intelligence (SIGINT) data.[4] Bangladesh Army can explore such opportunities to enhance its ISR capabilities.

Optimize Operational Planning and Support MDMP: The present security environment is characterised by the existence of multidimensional threats from conventional and non-conventional sources. It necessitates the commanders to take timely and precise decisions to confront the situations. Agentic AI based systems can act as a tool and support MDMP in such scenarios. Autonomous systems can integrate data from various sources and analyse Terrain Analysis (TERAN) data, inputs form ISR sources and historic references to generate Courses of Action (COA) and contingencies and visualise through War Gaming (WG). This will reduce the time and resource required for decision-making in critical scenarios like UNPKO and post-counter insurgency operations, where military application of force is concerned with political, social and information indicators. US defence technology company SANDTABLE has designed an AI-enabled decision support engine, *MENTAT,* that facilitates commanders' Decision Making Process (DMP) by integrating AI with human intervention and helps to validate plans by creating realistic scenarios.[5] Incorporating similar systems in Bangladesh Army can optimise operational planning and support MDMP.

Develop Training Modalities, Simulation and Doctrine: The integration of AI into higher military education has become a powerful factor in improving the effectiveness of professional training.[6] Agentic AI can be incorporated in the training institutions of Bangladesh Army to develop dynamic training lessons and assess trainees' performance. Such systems can provide data driven performance analysis, individualised tutoring and help adoptive learning. Bangladesh Army can upgrade its present simulators using AI powered Virtual Reality (VR) systems to bring diversity and efficiency in training. Besides, Immersive Virtual and Augmented Reality (AR) simulators can also be incorporated to train troops in various tactical scenarios in closed doors. Additionally, AI powered tools can develop 'Adversary Models' and simulate existing doctrines to suggest modifications. An example of such systems is the 'Live Training Simulator' used by the Finnish Land Forces. It is a laser-based force-on-force simulator that enables realistic training of infantry units and vehicle crews. The system records hits, simulates casualties and provides immediate visual and audio feedback to soldiers, supporting individual marksmanship and unit-level coordination.[7] These simulations will help achieving efficiency in training and development of time worthy doctrines for Bangladesh Army.

Photo-1: AI based VR Simulation for Tactical Training

Source: Author's self-contract

Strengthen Offensive and Defensive Capability through Autonomous Weapon Systems (AWS): Agentic AI can strengthen the offensive and defensive capabilities of the army in terms of lethal and non-lethal weapon systems. Bangladesh Army may employ AI-driven Unmanned Aerial Vehicles (UAV), robotic tanks and autonomous swarms that can analyse battle information, adapt to changing threat and execute coordinated attacks without direct human intervention. Besides, AI-powered cyber defence and electronic warfare systems can detect and neutralise evolving threats within the shortest time, thus strengthening the defensive platforms of Bangladesh Army. Agentic tools also provide cost-effective options for Bangladesh Army to employ comparatively less expensive but technically high-end strike capabilities in conflicts with limited risk to human lives and averting escalation. *Operation Spiderweb* is such an example where low-cost First Person View (FPV) Ukrainian drones utilised software that allowed them to navigate autonomously to destroy Russian Strategic Bombers worth seven billion US dollars. This also marks an evolution in fighting a superior force with autonomous weapons.[8]

Improve Administration, Logistics and Combat Service Support: Modern hardware involve more sophisticated and complex logistic chain, Agentic AI can forecast consumption rates, maintenance needs and supply bottlenecks for the smooth functioning of this channel. Bangladesh Army can employ AI-based systems to act as a 'proactive logistics monitor agent' to save valuable time and resources for maintenance. Besides, AI-integrated drones can deliver combat supplies in Army camps in CHT and be used in UNPKO. Additionally, AI can be

combined with Robotic Surgical Systems (RSS) and Robotic Ground Platforms (RGPs) to perform remote surgical support and rescue operations in war zones.[9] Recently, the Indian Army has begun using AI-powered drones and satellite imagery for logistics reconnaissance, surveying routes and infrastructure to support faster movement of supplies.[10] Incorporating AI will effectively reduce the tooth-to-tail ratio of Bangladesh Army and enhance its war-fighting capabilities.

Figure-2: Uses of Various Patterns of AI in Different Military Purpose

Patterns of AI	Modern-day Innovative Equipment/Tech
Goal-driven systems	Autonomous drones (e.g., MQ-9 reaper)
Autonomous systems	Self-driving military vehicles (e.g., KF51 panther)
Conversational/human interactions	Chatbots for military communication (e.g., US Army's Sgt. Star)
Predictive analytics and decisions	Predictive maintenance for military equipment (e.g., F-35)
Hyperpersonalization	GANs for personalized soldier training
Decision support	AI-assisted decision-making in military operations (e.g., SAGE)
Pattern and anomalies recognition	Object detection in military surveillance (e.g., Raven drone)

Source: Rashid, 2023

Challenges in Incorporating Agentic AI in Bangladesh Army

Vulnerability of Agentic AI for Military ISR: Despite the accuracy, Agentic AI-based ISR systems have inherent vulnerabilities. The accuracy and quality of the initial data fed into the system will largely dictate the subsequent products. Besides, AI-driven military systems are susceptible to algorithmic biases and systemic errors and unlike human intelligence, they tend to lack the capacity for moral reasoning or situational empathy.[11] Deliberate countermeasures deployed by the adversary like spoofing, camouflage and electronic warfare may seriously affect

the 'predictive intelligence' outcome of Agentic systems. Moreover, lack of infrastructure, technical limitations and interoperability with present conventional systems in Bangladesh Army may inhibit the performance of the Agentic AI-based ISR systems.

Over Reliance on Autonomous Systems and Challenges to Ethical Decision Making: Over reliance on autonomous systems for operational planning may lead to tactical miscalculations. Though AI can rapidly generate contingencies, lack of human judgement will seriously affect the entire planning during critical operations. Due to complexity of situations, commanders may face the dilemma of ethical decision making while using autonomous systems. Agentic AI-based decision support tool may suggest a seemingly harmless contact as threat which may create ambiguity in DMP. Besides, decision ownership will be blurred during failures as commanders may attribute the responsibility on AI. Moreover, decision-making systems are subject to cyberattack threats and impacts.[12] Therefore, maintaining human control remains essential to uphold military ethics in planning and human judgement.

Adaptation Challenges of Agentic AI in Military Training, Simulation and Doctrine: Integrating Agentic AI in training may pose some challenges in subjective evaluation of trainees. Besides, it may face difficulty to effectively replicate the complexity and human factors of real battlefield scenario. AI-based simulation may also undermine the role of human factor in any planning process. As military doctrines are mostly guided by strategic directives, over-reliance on autonomous systems to develop such may blindfold the military planners. In Bangladesh Army, limited AI literacy among trainers and commanders may result in misuse or misinterpretation of AI-based outcomes. Integrating AI systems with existing military infrastructure and processes can be challenging. This requires significant changes to existing systems and processes, which can be time-consuming and expensive.[13] Moreover, the cost, infrastructure requirements and validation of AI-based training systems pose significant constraints for sustained and effective implementation in Bangladesh Army.

Concerns Regarding Ethical Dimension of AWS: Employing AWS involves the ethical dimension of using such systems in the battlefield. The incorporation of Lethal Autonomous Weapon System (LAWS) and their use in warfare comes with genuine risks. It increases the pace and tempo of warfare, a process called 'battlefield singularity.' It can also heighten the potential of erratic launches and false alarms and manipulate the early warning systems.[14] Some have mentioned it as '*Pandora's box'* citing "once developed, lethal autonomous weapons will permit armed conflict to be fought at a scale greater than ever and at times scales faster than humans can comprehend."[15] This poses a more regulatory and legal implications of AWS for Bangladesh Army.

Operational and Institutional Challenges of Integrating Agentic AI in Administration, Logistics and Combat Service Support: The employment of Agentic AI in administration, logistics and combat service support involves critical operational and institutional challenges. Agentic AI requires high quality, real-time and structured data which may not be readily available

in traditional military systems. Besides, AI-driven logistics planning may struggle to respond effectively to sudden changes such as unexpected ammunition expenditure, equipment attrition or casualty. Organisational resistance to incorporation of automated systems is also an impediment to successful implementation. Additionally, excessive automation in administrative and sustainment functions may reduce human oversight leading to system collapse in crisis situations. The maintenance cost and operational requirement considerations for AI systems may also require serious attention before implementation in Bangladesh Army.

Plausible Measures to Implement Agentic AI in Bangladesh Army

Build Resilient and Human-Supervised ISR Structure: Bangladesh Army should develop a human supervised and resilient ISR structure to address future challenges. Agentic AI should be primarily employed for data processing, pattern recognition and anomaly detection while evaluation, final assessment and dissemination should be under human supervision. Multi-layered ISR systems involving UAV, radars and Human Intelligence (HUMINT) should be employed to reduce dependency on any single source. Periodic exercise and validation programmes must be continued to develop anti-electronic warfare immunity. Most modern armies have developed an ISR network where a large amount of ISR data from various sources is accumulated. But final assessment and dissemination is led by human. This practice can actively keep the over-reliance and dominance of Agentic AI-based systems in control.

Controlled Use of Autonomous Systems for Ethical Decision Making: Autonomous systems should be used in controlled manner to augment MDMP rather than 'directing' commanders. The authority for taking decision and execution should be under human control to ensure ethical use of autonomous systems. Bangladesh Army should regularise clear chains of responsibility for AI generated decisions. It will also facilitate flexibility and ownness of command. Besides, computational 'guardrails' should be developed to monitor AI tools in MDMP and intervene when agents begin to operate outside acceptable parameters.[16] Moreover, Bangladesh Army can progressively incorporate AI in DMP by allocating different levels of autonomy for low to high stake tasks. This will ensure control over autonomous systems and facilitate ethical decision making.

Phased and Institutional Integration of Agentic AI in Training, Simulation and Doctrine Development: Bangladesh Army should adapt a phased and institutionalised approach to integrate Agentic AI in training, simulation and doctrine development. AI-enabled tools should be introduced initially as supplementary training aid within existing courses and exercises. Faculty and instructors of the training institutions should receive elementary AI literacy training to ensure proper utilisation of AI tools. Trainees should also receive AI literacy training to develop human-AI teaming for optimum use of it. Army should encourage innovations and Research and Development (R&D) to develop VR based training models. Simultaneously, doctrine development should be based on frequent trial-error process and validations through

standard operating procedures. Bangladesh Army can also follow the models of countries mentioned in Table-1 for integration of AI in military institutions. Such an approach allows modernisation while preserving operational realism, institutional learning and long-term development.

Table-1: Comparative Analysis of AI Integration in Military Education

Country	Training simulators with AI	Adaptive learning platforms	Automated knowledge assessment	Financing innovation in defence education
Ukraine	Limited use; used mainly in pilot projects at military academies	Partial testing of adaptive platforms, including in cooperation with private IT companies	Use at entry level; depends on human factors	Low level of public funding; dependence on international assistance
USA	Large-scale implementation in all branches of the armed forces; active use of VR/AR with AI	Developed a network of adaptive systems (e.g. DARPA)	Widespread use in testing, skills assessment, progress forecasting	High level of funding (billions of dollars in budgets through the Defence Advanced Research Projects Agency (n.d.; 2025), etc.)
Great Britain	High level of integration, including multi-agent simulations	Adaptive learning environments are in place (e.g., as part of the Defence Learning Environment programme (Ministry of Defence, 2024))	Automated systems are partially implemented, considering ethical standards	Stable funding through the Ministry of Defence; cooperation with universities
Germany	Medium level of application; focuses on command-and-control training	Tested in selected military schools; emphasis on data security	Pilot systems in place; focus on accuracy and reliability	Moderate funding; emphasis on integration with civilian research institutions

Source: Bestyuk, 2025

Establish Ethical, Legal and Command Safeguard for Integration of AWS: Bangladesh Army should ensure ethical, legal and operator regulations for integration of AWS. It should always be deployed under *meaningful human control* to limit the risks that the outcome of AI systems will not meet the original intent, to identify promptly mistakes and unintended consequences.[17] Rules of Engagement (ROE) and Standard Operating Procedures (SOP) must clearly identify the limit of autonomy in employment of AWS. Dedicated training on judicial and ethical applications of AWS must be taught in higher military institutions. Though Bangladesh Army is yet to incorporate AWS in large scale however, these constraints must be kept in consideration for future procurement and use. Such measures ensure compliance with International Humanitarian Law (IHL) while enabling responsible adaptation of advanced military technology.

Adapt Sustained Approach to AI-Integrated Combat Service Support and Military Logistics: Bangladesh Army should adapt a controlled and sustained approach for future integration of AI in its combat service support and logistics. Agentic AI systems should be initially incorporated for data analysis and forecasting. However, decision making should be responsibility of human operator. Besides, focus should be given on developing infrastructure and indigenous capability to ensure sustained growth. National assets and collaboration with local universities can come in handy in this case. Robust communication and cyber-security measures must be enforced to protect AI-enables sustainment systems. Through such measures AI can enhance efficiency and responsiveness in military logistics and combat service support.

Conclusion

The twenty-first century warfare has shifted from conventional combat methods to a technology-driven battlefield. This shift has been mostly driven by advancement in the field of technology. Agentic AI is the latest inclusion in this drive. Alike other countries, this has also brought number of opportunities for Bangladesh Army in its quest of modernisation. Agentic AI can be incorporated in Bangladesh Army to develop her ISR capabilities, enhance MDMP and develop its training and doctrinal aspects. Agentic AI also enables the Army to develop its offensive and defensive capabilities by integrating lethal and non-lethal AWS. Moreover, the combat service support and logistical aspects of the Army can also be developed manifold with the use of Agentic AI-based systems.

Incorporation of any new technology in Bangladesh Army involves challenges. Use of Agentic systems inherently raises the concern of over reliance on it. As these systems involve 'human-out of the loop' roles, ethical decision making can be a critical challenge that needs to be addressed. Besides, due to lack of AI-literacy and adequate guidelines, there are possibilities of misuse of AI in training, simulation and doctrine development. Additionally, the legal and humanitarian aspects of AWS require distinct SOPs. The infrastructural and resource requirements, organisational resistance and weak cyber security may also cause detrimental effects on AI-based logistics system of the Army. These ethical, infrastructural and humane aspects of AI needs to be addressed to incorporate Agentic AI in Bangladesh Army.

Agentic AI can be effectively incorporated in Bangladesh Army provided the challenges are met with structural and institutional approach. Employing AI-powered ISR assets with human in the loop systems can enhance the reliability of these systems. Alongside, including the human component in AI-based decision-making tools will ensure ethical decision making. By developing AI literacy among the instructors and faculties and incorporating AI-based tools in existing training programmes and exercises will ensure phased and institutional integration of AI in training, simulation and doctrine development. Besides, establishing ethical, legal and command safeguards for AWS will pave the way for smooth integration of

AWS in the Army. Moreover, developing indigenous capability and home-grown specialists will help in adapting a sustained integration plan of AI in combat service support and military logistics. Through a balanced, ethical and phased integration of Agentic AI under firm human command, Bangladesh Army can enhance operational effectiveness while preserving its core values, discipline and responsibility to the nation.

Notes and References

1. A. Bestyuk, 'Integration of artificial intelligence into higher military education as a factor in increasing the efficiency of professional training,' *Scientific Bulletin of Mukachevo State University*, Ukraine, 2025.

2. ECStech, 2025. https://ecstech.com/ecs-insight/article/critical-missions-in-data-ai-empowering-federal- agencies-through-innovation/

3. A English, 'Agentic AI in Military Applications: Navigating the Promise and Peril of Autonomous Systems,' *Medium*, 2025 https://carolinagal14.medium.com/agentic-ai-in-military-applications-navigating-the-promise-and-peril-of-autonomous-systems-d5e1594f2b11

4. O. Gibson, et al, *Russian Offensive Campaign Assessment*, 2025. Institute for the Study of War, 2025 https://understandingwar.org/research/russia-ukraine/russian-offensive-campaign-assessment-june-1-2025/

5. G. Huckins, 'Are we ready to hand AI agents the keys?' *MIT Technology Review*, 2025.

6. S. Khalifeh, *The evolution of warfare from conventional to a digital battlefield: an analysis of cyber technology and artificial intelligence in the Lebanese Israel conflicts*, 2025 https://doi.org/https://doi.org/10.37868/dss.v6.id285

7. Legitsecurity, Agentic AI Security: Challenges and Safety Strategies, 2025 https://www.legitsecurity.com/aspm-knowledge-base/agentic-aiity#:~:text=be%20addressed%0first.Common%20Challenges%20When%20Using%20Agentic%20AI,new%20layer%20of%20security%20risks.

8. Modern Diplomacy, 2024 https://moderndiplomacy.eu/2024/10/19/ai-autonomy-and-arms-race-the-evolving-role-of-autonomous-weapons/

9. A. Y. Morzov, Decision-Making Technologies in Military Systems: Challenges and Prospects, 2023 http://www. immsp.kiev.ua/ publications/ articles/ 2023/ 2023_4/04_ 23_Yashchenko.pdf

10. A. B. Rashid, 'Artificial Intelligence in the Military: An Overview of the Capabilities, Applications and Challenges,' *International Journal of Intelligent Systems*, 2023. https://doi.org/https://doi.org/10.1155/2023/8676366

11. K. Saastamoinena and J. Nuutinen, 'Next-generation readiness: applying AI to military simulators and wargaming in Finland,' *ScienceDirect*,

12. Sandtable 2025. https://www.sandtable.co/

13. M., D. M. Taddeo et at, 'Ethical Principles for Artificial Intelligence in National Defence,' *Philosophy & Technology*, 2021 34.

14. *The Guardian*. August 2017 https://www.theguardian.com/technology/2017/aug/20/elon-musk-killer-robots-experts-outright-ban-lethal-autonomous-weapons-war

15. *Agentic AI: Does the Future of Warfare Look Autonomous*? The Soufan Centre, 6 August 2025, https://thesoufancenter.org/intelbrief-2025-august-6/

16. *Ibid*.

17. *Vision AI India*. September 2025. https://visionaiindia.com/blog/ai-in-defence-logistics-faster-leaner-more-resilient-operations/

Brief Biography

Major Ausiuddin Aftab Abir, psc was commissioned from Bangladesh Military Academy (BMA) with 71st BMA Long Course in the Corps of Infantry on 24 December 2014. He has served in the 27 East Bengal Regiment and 1 Para Commando Battalion in different regimental appointments. Apart from mandatory courses, he has attended Army Commando Course and National Investigation Office (NIO) Course. He has also attended Survival, Escape, Evasion and Combat Tracking Course in Sri Lanka and Counter Terrorism Command Programme in China. He has obtained Bachelor of Science and Masters of Social Science in Security Studies from Bangladesh University of Professionals (BUP). He is a graduate from Defence Services Command and Staff College, Mirpur. Presently, he is serving as General Staff Officer-2 (Operations) in HQ Para Commando Brigade.

Lessons from the Russia-Ukraine War for Artillery: Implications for Bangladesh Army

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Abstract

The ongoing Russia-Ukraine War has become the most important example of high-intensity, artillery-based warfare of the contemporary era and there are lessons for modern armies to be learnt. Contrary to earlier perceptions of the effectiveness of precision weapons and air power, the conduct of the conflict has again affirmed the decisive role of massed fires and at the same time revealed new vulnerabilities caused by persistent surveillance, unmanned aerial systems, electronic warfare and quick counter-battery engagements. Artillery units operating in Ukraine have been forced to evolve constantly as their missions have required increased mobility, dispersion and faster problematic sensor-to-shooter cycles and improvement of integration with reconnaissance assets. This article studies the key aspects of artillery employment witnessed in the Russia-Ukraine War such as the changing nature of counter battery warfare, the key role of unmanned aerial vehicles in target acquisition, battle damage assessment and the growing importance of logistics and ammunition sustains in prolonged conflicts. It goes on to explore how survivability has become as important as firepower in an environment with ubiquitous surveillance capability and fast strikes with precision munitions. Drawing on such observations, the paper asses the implications with respect to artillery-centred armies with particular emphasis on Bangladesh Army. Without trying to replicate directly, it brings to the fore considerations from a conceptual, doctrinal and training perspective which is relevant to the operational theatre and resource realities of Bangladesh. The paper speaks in favour of adaptability, integrating emerging technologies into gun systems and realistic sustainment planning and should be ingrained into artillery as a way of continuing to be effective in future conflicts.

Keywords*: Artillery Warfare, Russia-Ukraine War, Counter-Battery Operations, Unmanned Aerial Vehicles, Sensor-to-Shooter Cycle, Artillery Survivability, Ammunition Sustainment.*

Introduction

The nature of land warfare has changed dramatically over the past several decades, propelled on the one hand by the development of precision weapons, digital command and control systems and persistent intelligence, surveillance and reconnaissance capabilities, on the other. Besides the real-world proof of the decisive effect of artillery in Second World War (1939-1945), recent wars have shown that the indirect fire systems have continued to play a godly role in high intensity wars.[1]Among contemporary conflicts, the ongoing Russia-Ukraine War which began in February 2022, is the highest example of artillery centric warfare in the twenty-first century and provides valuable empirical data on the use, contestation and adaptability of artillery

under modern battlefield circumstances. The Russia-Ukraine War has been marked by massive use of tube artillery and multiple launch rocket systems and their application on prolonged periods and over long fronts.[2] Artillery units on both sides have been tasked with providing massed fires under threat of being constantly targeted by the use of counter-battery radars, UAVs, loitering munitions and EW Systems.[3]

One of the most demanding characteristics of the conflict has been the innovative use of UAVs to acquire targets, adjust fire and assess battle damage.[4] Integration of UAVs into the artillery operational chain has been used to reduce the target acquisition and engagement sensor-to-shooter cycle to unprecedented levels, providing rapid target detection and engagement. At the same time, this development has made artillery units even more vulnerable, as the enemy can now locate and attack firing positions in terms of minutes after gun displacement.[5] Thus, mobility, dispersion, camouflage and deceit have become key factors that determine the survivability of artillery units. In parallel, the War in Ukraine has made it obvious just how important logistics and ammunition sustainment would be in more artillery-intensive operations. The level of ammunition expenditure witnessed in the conflict has placed unprecedented demands on industrial production, ammunition stockpiling and supply chains.[6] This has reinforced the reality that the effectiveness of artillery is not only a matter of the systems themselves and tactics, but also of the capacity of a nation to sustain a prolonged fire operation in a wartime setting.

For armies like Bangladesh Army, the lessons coming out of Russia-Ukraine War are worth studying. While the strategic landscape of Bangladesh is distinct from that of Eastern Europe, the trends at play are similar everywhere, i.e. consistent surveillance, quick counter-battery fire and sensor integration.[7] This article therefore, aims to analyse some of the key observations drawn from the Russia-Ukraine War and derive the implications for the development of doctrine, training and capability development in Bangladesh Army.

Artillery Employment in the Russia-Ukraine War

Centrality of Artillery to High Intensity Conflict: The Russia-Ukraine War has re-emphasised the role of artillery as the dominant weapon in high-intensity ground conflict and especially in conflict involving attrition, protracted frontages and little room for manoeuvre. Both Ukrainian and Russian forces have equally relied on tube artillery and multiple launch rocket systems to produce combat power, suppress enemy formations and denies access to terrain while failing to advance higher precision weaponry and air power. The conflict shows that artillery is still inestimable not only for destruction but also for the choice of the tempo and character of operations. Unlike counter-insurgency campaigns where the use of artillery is selective and limited to strict rules of engagement, in Ukraine, artillery has been used continuously and on a large scale. Firepower has been used to fix the enemy forces, disrupt defensive preparations and psychological pressure.

Scale and Intensity of Artillery Fire: One of the most striking aspects of artillery use during the Russia-Ukraine War has been the conspicuous amount of ammunition being used. Daily consumption rates have often been higher than the battle in Iraq and Afghanistan, highlighting the battles of attrition carried out on a huge scale. This level of intensity reflects not just the length of the war, but the importance of artillery in fighting a modern-day warfare. Such intensity has revealed the effectiveness of massed artillery fires when used in defensive and offensive operations.[8] It has also disclosed inherent trade-offs. High rates of fire force wear and tear on the barrel, put a strain on logistics systems and expose firing units to enemy sensors. The Russia-Ukraine War thus exhibits that while the role of mass is a critical part of artillery success, this has to be carefully balanced against survivability and sustainment considerations.

Counter-Battery Warfare and the Detection: Counter-battery warfare has become a hallmark of the artillery battle. The mass employment of counter-battery radars, acoustic sensors and UAVs have made the survivability of traditional firing positions much lower. Once a battery goes to action, it may take minutes for detection, especially if adversaries had integrated systems of sensors. This has made long range firing from static gun areas increasingly impractical. As a result, the units of artillery have been forced to change the way in which they are employed. Gun positions are frequently changed within short duration. The focus has shifted from protection by fortification to protection by movement. This development is a complete break from previous doctrine that focused on the hardened gun areas and locks in the belief that in modern artillery warfare it is time rather than position that decides survivability.

Unmanned Aerial Vehicles Role: UAVs have played a decisive role in the shaping of the artillery employment throughout the conflict. Tactical drones (as well as commercially-available systems) have been widely employed for fire location, fire adjustment and battle damage assessment. Persistent aerial surveillance has made conventional concealment methods much less effective, since slight movement or signature emissions could be detected. In response, the artillery has turned to greater dispersion, camouflage and deception. The use of dummy positions and false signature have become a necessary part of artillery survivability, as they absorb enemy fires and make enemy counterbattery complexity. However, these measures require extra resources and training, which is an increasing complication of the artillery in a drone saturated battlespace.

Communication and Liaison with Manoeuvre Forces: One of the most common trends in the Russia-Ukraine War has been the integration of artillery employment with manoeuvre forces. Rather than exist as a distant supporting arm, artillery units have frequently been far more intimately linked with infantry formations and enabled responsive fires in defence actions and limited counter-attacks.[9] This integration has been the result of digital communications and forward observers with suitable actual-time aiming tools. At the same time this dependence on digital connectivity has created vulnerabilities. EW caused communication disruption, degraded targeting accuracy and meant that artillery units must return to pre-planned or decentralised command.[10]

Adaptation under Enemy Counter Bombardment: Perhaps the most important characteristic of artillery employment in the Russia-Ukraine War has been constant adaptation. Units that did not attempt to change their tactics, their patterns of movement and their mechanisms of coordination found themselves taking heavy losses. Units who demonstrated flexibility were able to sustain their combat effectiveness. The Russia-Ukraine War thus shows that artillery units need to be ready to learn and change when facing war conditions, rather than sticking to old planned and expired doctrines.

Sensor-to-Shooter Cycle: A Dominant Factor

Conceptual Evolution of Sensor to Shooter Cycle: The cycle of target identification, engagement and determination using the indirect fire systems is referred to as the sensor-to-shooter cycle. While the basic idea is not new, there is a qualitative change in the speed, accessibility and impact of its operation, as the Russia-Ukraine War has showed. The use of new developments in unmanned aerial systems, digital communications and data transmission has made this cycle much more dynamic. What previously had to be done in layers of observation and command approval could now be accomplished in minutes, essentially upsetting the threat balance between detection, engagement and survivability. In the case of Ukraine, artillery effectiveness was less dependent on maximum range or volume of fire, as increasingly it has been about getting a unit from detection to engagement and then redeployment as quickly as possible. As a consequence, the sensor-to-shooter cycle has become a key factor in success or lack of indirect fire battle.

Unmanned Aerial Vehicles as Major Sensors: UAVs have taken over as the main sensing elements in the modern artillery kill chain. Tactical drones, even commercial ones, have been widely used to identify enemy artillery positions, troop concentrations and logistical nodes. Unlike an observer, UAVs offer persistent surveillance and the chance to continuously monitor targets. This has greatly decreased the uncertainty involved in target acquisition and greatly increased the accuracy and responsiveness of artillery fires. However, this capability has also reduced the margin of error. Once a firing position is detected, it may be subjected to rapid counter-battery fire. With the mass distribution of drones, observation has therefore changed from a scarce capability to a ubiquitous threat that forces artillery units to assume that any emission, movement and firing activity may be observed in near real time.

Counter-Battery Engagement: In Ukraine, the battle of attrition is all about time and not about firepower. Detection through counter-battery radars, acoustic or UAVs may be followed by retaliatory fires within minutes. This has changed survivability into a matter of how fast a unit can accomplish its fire mission and move away. As a consequence, the employment of artillery has been characterised by shoot and scoot technique and the utilisation of multiple alternate firing positions.

Vulnerabilities in Sensor to Shooter Chain: Despite its benefits, the sensor to shooter system is also vulnerable. Heavy dependence on digital networks and unmanned systems has exposed increased vulnerability to EW and signal disruption.[11] This has had such an effect in Ukraine that periods of heavy EW have diminished drone operations, interrupted communications and forced artillery units to return to alternative ways of acquiring targets and planning fires. These disruptions have called for importance of redundancy and flexibility. Units that maintained proficiency in standard observation methods and pre-organisation of fire, among other things, were better able to continue operations under degraded conditions. Consequently, the conflict underlines the need for technological integration to be accompanied by training in contested and denied environments.

Persistent Surveillance and Signature Management: Persistent surveillance has helped to expand the sensor to shooter cycle for more than just the firing sequence. Artillery units are now exposed not only during fire missions, but also during movement, communications and preparation phases as well. Thermal signatures, movement patterns and electromagnetic emissions may have a role in the detection. Consequently, survivability is now a continuing process, as opposed to a discrete practice. This environment requires increased levels of discipline over movement control, communication procedures and camouflage practices. The Russia-Ukraine War has shown that good signature management is as important in the survivability of artillery as are the more traditional aspects of protection. It is a good example to illustrate why a holistic approach to operations under constant observation is necessary.

Survivability, Mobility and Dispersion of Artillery Units

Survivability as a Principle Operational Requirement: The Russia-Ukraine War has shown us that the survivability of artillery systems is not a secondary factor any more but a primary operational requirement. Persistent surveillance, counter-battery engagement at high speed and widespread utilisation of UAV have greatly lowered the tolerance for static artillery deployment. Artillery units that were not able to make survivability a priority suffered disproportionate losses regardless of the calibre or range of their weapon systems. The conflict highlights the nature of modern high intensity warfare that ability to go undetected or to minimise the exposure time once detected, is fundamental in maintaining continued artillery effectiveness. Traditional approaches to survivability, which emphasised fortification and protection, had been shown to be inadequate in conditions of constant observation. Instead, survivability had come to be closely tied up with mobility, dispersion and disciplined operational behaviour.

Mobility and the 'Shoot-and-Scoot' Imperative: Mobility has become the key factor of artillery survivability in the Russia-Ukraine War. Once a battery goes to fire, it may be detected using counter-battery radars, UAVs or other sensors within minutes. As a result, prolonged firing of batteries from the same location has become increasingly dangerous. Artillery units have

therefore resorted to 'shoot-and-scoot' tactics as a rule rather than as an exception. Rapid displacement after fire missions has lessened the risk of counterbattery fires from fire strikes, but this has also created new requirements for training, Command-and-Control (C2), logistics.

Dispersion and Deployment of Guns: The Russia-Ukraine War has shown the importance of dispersion when it comes to teenage the effects of counter-battery fire and precision strikes. Concentrated gun areas have proved vulnerable to identification and destruction, especially if the enemy have available a network of integrated sensors. In an effort to be defended against, artillery units have tended to spread their guns over wider areas, often by having many small firing locations rather than one centralised battery location. While dispersion makes it less vulnerable, it also makes it more complex in terms of command and control and in logistics. The experience in Ukraine highlights the need to strike a balance between dispersion and the need for the co-ordination of fires and sustainment, reinforcing the need for flexible organisational structures and adaptable leadership.

Camouflage, Concealment and Deception: Camouflage and concealment are key elements of artillery survivability even today and have been compromised with the advent of modern surveillance technologies. Thermal sensors, high resolution image, persistent UAV observation are diminishing the capability of traditional visual camouflage methods. In such an environment, deception is of an enhanced importance as a complementary measure. Artillery units in Ukraine have used dummy positions, false signatures and misleading movement patterns to confuse enemy sensors and absorb counter-battery fires. These acts have proven fruitful in helping to preserve combat power, importance in planning and allocating resources. The conflict shows us that impersonation is not some auxiliary activity, but an integrated activity in artillery operations in a contested battlespace. The example of the War in Ukraine underscores the importance of discipline in movement planning and control of communications and thermal and electronic signatures. Survivability is thus a process rather than single point events during the operational cycle to which, per se, attention must be directed. This is a major cultural change for artillery units that are used to operating from somewhat secure rear areas.

Human Factors and Organisational Factors: Survivability is also impacted by human and organisational factors. High operating tempo, frequent displacement and exposure to continued threat place enormous strains on artillerymen - both physically and psychologically. Fatigue, stress and impaired situational awareness can contribute to risk of error, accidents and delayed responses. Units that were ordered, had supervision of leadership and realistic training were better able to deal with these pressures. The argument of the Russia-Ukraine War is that survivability is not a purely technological issue, but one of humanity. Effective leadership, training and morale are necessary in order to continue to have the resilience to operate under constant threat.

Ammunition, Logistics and Survival within Artillery-Intensive Warfare

Ammunition as a Strategic Determinant: The Russia-Ukraine War has made it clear that ammunition does not just play a strategic role in artillery-based warfare, but rather a strategic factor in the logistical trail of weaponry. Sustained high-intensity operations have necessitated staggering amounts of artillery ammunition, often surpassing pre-war planning assumptions.[11] The nature and scope of artillery action in Ukraine have shown that operational success is not only a function of tactical skill, but can also be influenced by one's ability to sustain constant fire over long periods of time. This reality has overturned conventional beliefs about ammunition consumption rates. In Ukraine, periods of heavy fighting have led to levels of expenditure per day that quickly depleted existing stockpiles necessitating both sides to adjust the tempo of operations according to the availability of supply.[12] The conflict emphasises the point that artillery effectiveness is inseparable from realistic sustainment planning and particularly war of attrition.

Industrial Capacity and Endurance of War: A critical lesson to learn from the Russia-Ukraine War is the importance of industrial capacity of supporting prolonged artillery operations. The conflict has exposed large gaps between the peacetime production rates and the wartime consumption needs. Many countries have found it difficult to ramp up ammunition production fast enough to keep up with the operational need highlighting the strategic vulnerability from a lack of surge capacity in industrial production. For the armies who relied on artillery the lessons are not limited to the battlefield but also to the national defence planning. The capacity to keep up artillery fire over time is directly related to industrial preparedness, supply chain resiliency and access to the raw materials.[13] The Russia-Ukraine War shows that sustainment is not a purely military function but a whole nation endeavour that plays a key factor in strategic endurance and freedom of action.

Supply Chain Management under Persistent Threat: Logistics in warfare with artillery is increasingly carried on under continuous threat. In Ukraine, phasing ammunition depots, transport corridors and resupply convoys have been attacked using long-range fires and aerial reconnaissance. This has pushed logistic elements to make use of dispersion, concealment and frequent movement in the same way as survivability difficulties experienced by combat units. The requirement of preserving the ammunition stocks, at the same time ensuring the level of resupply has caused considerable complexity to artillery functioning. Delays or problems in supply chains have had direct tactical implications, both in limiting fire missions and in narrowing operational choices.[14] The war highlights the importance of logistics and suggests that future operations must incorporate logistics considerations right from the outset, not waiting to be addressed as a function of the rear area.

Maintenance of Artillery Systems and Men: After the ammunition, the survival of artillery guns and crew is an important aspect to focus on. High rates of fire accelerate wear of the barrel and increase the requirement for maintenance and places a greater burden upon the

technical support elements. In Ukraine, constant use of artillery has led to frequent maintenance, repair and replacement of parts, sometimes under difficult conditions. All equally important is sustainment of artillery crews. Prolonged exposure to high levels of operational tempo, frequent displacement and constant threat had taken a heavy toll on personnel, both physically and psychologically. Fatigue and stress had impacted performance and there was a need for the proper personnel rotation, leadership management and realistic training to prepare crews for extended operation as opposed to short-duration engagements.

Implications of Ammunition Shortage for Operations: The Russia-Ukraine War shows that the availability of ammunition has a direct influence on the formation of operational decisions. Commanders have been forced to do things like prioritise targets, select fire-missions, weigh short-term tactical gains against longer-term considerations of sustainment. In some cases, even limitations in ammunition supply may have dictated operational pauses or changes in emphasis, pointing to influence of logistics considerations on combat tempo. This experience destroys the impression that the employment of artillery cannot be isolated from the realities of sustainment. Effective operations of artillery units rely on a balance between ambition and endurance and making sure that firepower is effectively applied in a decisive way without resorting to a premature exhaustion of critical resources. For artillery, this balance is a key operational issue in the future high-intensity conflict.

Implications for Bangladesh Army

Doctrinal Implications for Employment of Artillery: The Russia-Ukraine War brings up the need for artillery doctrine to adapt because of this constant surveillance, speedy Counter-Battery Fire and compressed decision cycles. For Bangladesh Army it does not mean complete replacement of doctrine, but refinement of what has been previously established. Traditional concepts favouring static areas of guns and sustained firing from prepared positions may have to be reassessed in the light of the enhanced vulnerability evident in modern conflicts. Doctrine has to closely reflect the fact that artillery survivability is time based rather than position based. This gives added importance to rapid displacement, dispersion and flexibility of fire employment.

Training and Human Resource Development: The experiences of the Russia-Ukraine War show that technology alone is not a decisive factor in the effectiveness of artillery and that training and human factors still play a decisive role. For Bangladesh Army, training may need to put more focus on operating under persistent threat, regular displacement and degraded communications.[15] Exercises based on assumption of uninterrupted communications and stable firing positions can lead to unrealistic expectations on the part of the crews and commanders. Additionally, cognitive requirements of fast decision-making in rushing sensor-to-shooter cycles must be met through training. Junior commanders and fire control personnel need confidence and competence to make decisions within an area of delegated authority. This reinforces the

importance of command principles, backed up with realistic training scenarios that include simulations involving time pressure, information overload and uncertainty.

Role of Unmanned Systems with Artillery Units: One of the most important things that has been learnt from the conflict in Ukraine is the importance of unmanned systems in artillery. For Bangladesh Army, the implication here is not only procurement of UAVs, but effectively integrating UAVs into artillery units as organic reconnaissance and targeting assets. However, to effectively do so, there has to be doctrinal clarity, SOPs and joint training between the artillery personnel and the unmanned system operators. Equally important is the development of awareness of measures related to counter-unmanned aerial systems. Artillery units need to be trained so that they operate under continual aerial observation and so that their signatures are reduced to avoid giving away position. The concept should be to integrate at a unit level in the sense of not allowing the unmanned systems to detract from artillery units trying to rely on such systems and should ensure maximum integration of UAV systems without ensuring over-reliance on any of them.

Command and Control Issues: The Russia-Ukraine War has also shown us that arrangements for the C2 of artillery must include facilitating speed and flexibility in their operation. For Bangladesh Army, this has implications of the need for balancing centralised control and decentralised execution. Excessive layers of approval can as well affect responsiveness in time-sensitive engagements, while excessive decentralization of control may affect efforts becoming so fragmented.[16] Effective C2 thus requires the frameworks of engagement (clear), procedures (rehearsed) and trust (subordinate leaders). In providing training and guidance on doctrine, the conditions under which delegated authority is exercised should be strengthened, which means that artillery units should be able to exploit fleeting opportunities and still maintain co-ordination with supported formations.

Adaptation within Resource Constraints: One of the critical implications of the Russia-Ukraine War is that adaptation does not always mean high cost solutions. Many effective measures that were seen in conflict, for example, improvements in dispersion, discipline in movement, deception and procedural improvements, are organisational and behavioural rather than technological.[17] In the case of Bangladesh Army, this offers an opportunity to improve artillery effectiveness through incremental and low-cost changes which are in line with existing capabilities. The focus needs to be, therefore, placed on developing a culture of learning and adaption within the artillery units. After-action reviews, experimenting during training and being open to doctrinal improvement on a case-by-case basis can allow for continuous improvement without creating unsustainable financial or organisational loads.

Conclusion

The Russia-Ukraine War has reaffirmed that artillery still has a role as a decisive arm in high-intensity land warfare, while at the same time proving that artillery effectiveness is increasingly determined by survivability, adaptability and sustainment, as opposed to just firepower. Perpetual surveillance, quick response counter battery fires and ubiquitous use of unmanned systems have changed the operating conditions for artillery in a fundamental way. In this environment, mobility, dispersion and disciplined operational behaviour have become necessary to ensure the maintenance of combat effectiveness. The conflict is an example of how use of modern artillery is no longer platform-centric, but instead system-centric. Integration of sensors, decision-making processes with shooters into a viable and responsive system makes the difference between success and failure. Equally important is the realization that there are logical limits to operations with artillery which is constrained by logistics and industrial capacity. Ammunition availability, maintenance and crew endurance all have direct influence in influencing operational tempo and strategic endurance and serves to propagate the message that logistics is a combat function rather than a real area concern. For Bangladesh Army, there are lessons from the Russia-Ukraine War, but they do not mean replicating practices taken elsewhere. Differences in geography, strategic situation and resource availability require a selective and contextualised approach. However, the underlying trends reflected in the affair persistent surveillance, compact sensor-to-shooter cycles and the increasing significance of adaptability are of universal character. By updating doctrine, improving realistic training, incorporating unmanned aerial systems in a judicious manner, Bangladesh Army can improve the effectiveness and survivability of its artillery. In the end, the key lesson of Russia-Ukraine War is that artillery is still what it is all about if you can see and decide to move and sustain. If armies in the modern era want to maintain a capable and battle worthy posture, internalizing these lessons and making appropriate changes to them is a need of time.

Notes and References

1. Jack Watling and Nick Reynolds, *Meatgrinder: Russian Tactics in the Second Year of the Ukraine War*, London: Royal United Services Institute, 2023. Available at: https://www.rusi.org/explore-our-research/publications/special-reports/meatgrinder-russian-tactics-second-year-ukraine-war.

2. International Institute for Strategic Studies, *The Military Balance 2024*, London, IISS, 2024. Available at: https://www.iiss.org/publications/the-military-balance/the-military-balance-2024.

3. Jack Watling, 'Artillery and Attrition in the War in Ukraine,' *RUSI Journal*, Vol 168, Issue 3, 2023, pp. 14–27. Available at: https://www.tandfonline.com/doi/full/10.1080/03071847.2023.2228211.

4. Oisín Molloy, *Drones in Modern Warfare: Lessons Learnt from the War in Ukraine*, Canberra: Australian Army Research Centre, Occasional Paper No. 29, 2024. Available at: https://researchcentre.army.gov.au/library/occasional-papers/drones-modern-warfare.

5. Reuters, 'Fire and hide: Ukraine's artillery pinned down by Russian drones', 7 May 2024. Available at: https://www.reuters.com/world/europe/fire-and-hide-ukraines-artillery-pinned-down- by-russian-drones-2024-05-07/.

6. U.S. Department of Defence, *Munitions and Sustainment Lessons from the War in Ukraine*, Washington DC: 2024. Available at: https://www.defence.gov/News/Reports/Report/Article/ munitions-lessons-ukraine/.

7. Jack Watling, *The Arms of the Future Battlefield*, London: Royal United Services Institute, 2023. Available at: https://www.rusi.org/explore-our-research/publications/whitehall-reports/ arms- future-battlefield.

8. J.B.A. Bailey, *Field Artillery and Firepower*, Annapolis: US Naval Institute Press, 2004. Available at: https://www.usni.org/press/books/field-artillery-and-firepower.

9. NATO Defence College, *The Role of Fires in High-Intensity Conflict*, Rome: 2023. Available at: https://www.ndc.nato.int/research/research.php?icode=697.

10. International Institute for Strategic Studies, 'Electronic Warfare in the Ukraine War', *Strategic Comments*, 2023. Available at: https://www.iiss.org/online-analysis/strategic-comments.

11. International Institute for Strategic Studies, *The Military Balance 2023: Chapter on the War in Ukraine*, London, IISS, 2023. Available at: https://www.iiss.org/publications/the-military-balance.

12. Reuters, 'Ukraine war exposes global shortage of artillery ammunition', 15 March 2023. Available at: https://www.reuters.com/world/europe/ukraine-war-exposes-global-shortage-artillery-ammunition-2023-03-15/.

13. RAND Corporation, *Protracted War and Industrial Mobilisation*, Santa Monica, RAND, 2023. Available at: https://www.rand.org/pubs/research_reports/RRA2670-1.html.

14. Congressional Research Service, *Defence Logistics and the War in Ukraine*, Washington DC, 2024. Available at: https://crsreports.congress.gov/product/pdf/IF/IF12102.

15. UK Ministry of Defence, *Land Warfare Doctrine: Lessons from Contemporary Conflict*, London: MOD, 2023. Available at: https://www.gov.uk/government/publications/land-warfare-doctrine.

16. NATO Allied Command Transformation, *Mission Command in Multi-Domain Operations*, Norfolk: 2023. Available at: https://www.act.nato.int/articles.

17. RAND Corporation, *Military Adaptation in High-Intensity Conflict*, Santa Monica: RAND, 2024. Available at: https://www.rand.org/pubs/research_reports/RRA2589-1.html.

Brief Biography

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Internet of Battlefield Things: Enhancing Tactical Effectiveness in Bangladesh Army

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Abstract

The rapid digitization of contemporary conflicts has transformed warfare in the ways militaries collect, process and exploit battlefield information. The core centre of such change is the Internet of Battlefield Things (IoBT), which integrates soldiers, sensors, autonomous platforms and communications infrastructure into an integrated operational ecosystem. In the case of Bangladesh Army, the use of the IoBT is not only a technological desire but an operational priority, considering that its sets of missions are numerous and include traditional defence, counterinsurgency, disaster management and the peacekeeping of United Nations forces. This paper examines the way in which IoBT can be used to improve tactical agility through a reduction in the Observe-Orient-Decide-Act (OODA) loop and enabling commanders to have improved and faster decision-making process. It discusses some of the most important applications such as wearable technologies that make soldiers part of networks, autonomous systems that make surveillance safer and reduce risk to the personnel and the edge computing which makes it possible to process data even in a challenging environment. The study further emphasizes the applicability of the IoBT to urban warfare, jungle warfare and to peacekeeping contingents, where force protection and situational awareness are crucial factors. IoBT has significant opportunities but still, problems like bandwidth constraints, cyber-security threats, environmental factors and doctrinal adjustment are still very relevant. The paper ends by providing a progressive roadmap specific to Bangladesh Army that balances technological ambition with sustainability, ensuring IoBT integration strengthens operational effectiveness without excessive resource consumption.

Keywords*: Internet of Things (IoT), Internet of Battlefield Things (IoBT), Bangladesh Army, Edge Computing, Automated Platform, Sensors, Wearables.*

Introduction

Over the last few decades, modern warfare has experienced an extensive digital shift. Military operations are becoming reliant on interconnected systems that collect, process and share battlefield information in real time. This shift toward networked warfare has given rise to the Internet of Battlefield Things (IoBT), a military adaptation of Internet of Things (IoT) technology used by civilian counterparts that connects soldiers, vehicles, weapons, sensors and command posts into an integrated ecosystem.[1] A recent study from International Institute for Strategic Studies (IISS) in its *Military Balance*, finds that digitization is no longer a strategic option, but an

operational requirement of South Asian militaries to compete effectively in this regional geopolitically dynamic environment.[2]

Bangladesh Armed Forces specially Bangladesh Army must remain operationally effective across diverse terrains, including densely populated urban areas, jungles and hill tracts to ensure continuity in conventional defence, counterinsurgency, disaster management and United Nations (UN) peacekeeping operations. The key to military success has always been the capability to quickly receive and respond to battlefield information.[3] A study on network-centric warfare highlights that integrated sensor networks and interconnected communication systems significantly shorten the Observe-Orient-Decide-Act (OODA) loop, enabling more agile decision-making at the tactical edge.[4] This acceleration of the decision-making process presents both an opportunity and a challenge for Bangladesh Army: an opportunity to harness networked technologies for enhanced operational agility and a challenge in terms of adapting doctrine, training and resource allocation to fully realize these advantages.

This article explores how Bangladesh Army can enhance its tactical capabilities through practical steps to adopt the IoBT. It begins by defining key concepts of battlefield networking, then examines applications such as wearable technologies, autonomous systems, tactical data processing and edge computing. The discussion focuses on implementation within the distinct operational environments of Bangladesh, identifies key challenges and proposes a realistic integration plan. The emphasis remains on viable and sustainable solutions tailored to the needs of Bangladesh rather than imitating the systems of larger armies with different missions and constraints.

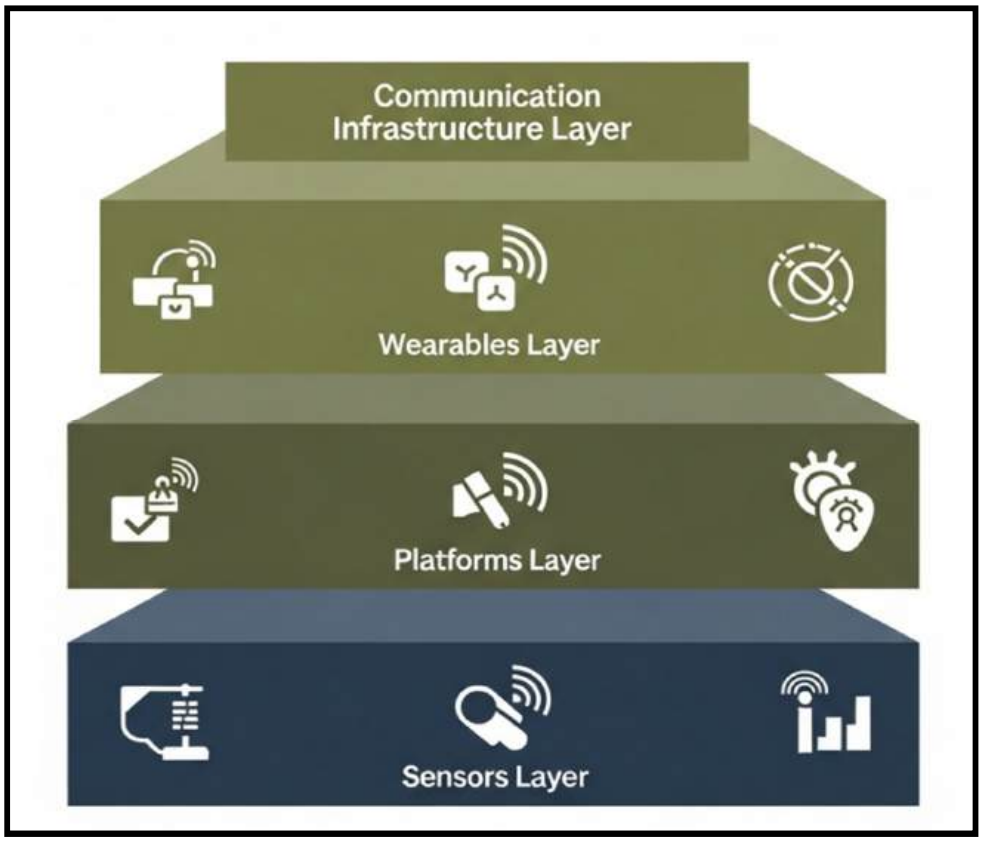
Concepts of IoBT

The interconnection between combat equipment, stores and other battlefield resources is referred to as the IoBT.[5] IoBT is a military-specific adaptation of networked technologies that establish a full digital ecosystem between personnel, equipment and sensors throughout the operational environment.[6] In contrast to the traditional military communication where the main features were the voice delivery between the command elements. IoBT allows the constant exchange of data between many devices and their integration to increase the level of visualization and coordination of operations on the battlefield. IoBT is described as a robust network of sensors, platforms and systems that jointly acquire, process and share information on the battlefield to facilitate faster decision-making and coordinated action.

The IoBT architecture is functional and has four major components such as Sensors, Platforms, Wearables and Communication Infrastucture.[7] The perceptive layer is made up of ***sensors*** which gather environmental and tactical information by detecting motion on the ground, monitoring cameras, acoustic arrays and systems used to track the positions of soldiers and

monitor their status. Autonomous *platforms* such as unmanned aerial vehicles, ground robots and distance sensors spread the network into new areas and limit the exposure of personnel. *Wearable technologies* bring soldiers into the network directly with equipment that has embedded communications and position trackers. Connections are also offered by *communication* nodes, which include tactical radios, mobile adhoc networks, satellite links and field servers which are used to deliver information to decision-makers.

Figure-1: Core Components of IoBT Framework



Source: Author's self-construct

IoT vs IoBT: Although the IoBT uses numerous technologies available to civil technologies, a number of key differences characterize the specifics of military missions. *The Journal of Military Communications Technology* notes that military networks have much higher security requirements than civil standards and defence systems often use multiple levels of encryption, authentication and segmentation to survive advanced cyber-attacks.[8] Environmental resilience distinguishes military systems, which must function in extreme conditions including intense heat, humidity and electromagnetic interference. The constraints on power push the goal of low-power-based components and smart control protocols. Another important distinction is

spectrum management. Battlefield networks must have frequency agility and anti-jamming strategies to operate in hostile electromagnetic environments where opponent forces actively attempt to disrupt communications. The key differences between IoT and IoBT has been illustrated below:-

Table-1: Differences between IoT and IoBT

Aspect	IoT	IoBT
Security	Basic encryption	Multi-layered, cyber-attack resilient
Environment	Normal conditions	Extreme heat, humidity, EMI, rugged terrain
Power	Stable supply	Low-power, smart protocols for endurance
Spectrum	Civilian bands	Agile, anti-jamming, contested domains
Purpose	Convenience, efficiency	Tactical advantage, survivability in combat

Source: Author's self-construct

Modern Conflict Strategic Value: IoBT integration provides several strategic benefits to the military. A network-centric application of warfare has a positive outcome of decision superiority, as commanders can execute their OODA loops much quicker than opponent commanders because of better information flow.[9] As an interconnected system enables forces to be physically separated and yet virtually coordinated, distributed operations become more possible. Linking sensors directly with weapons makes strikes faster and more accurate, cutting the time between spotting a target and engaging it to just a few seconds in recent field exercises. Force protection is augmented by early threat identification, automatic notification and minimized exposure of personnel to hazardous activities.

Global Perspectives: Major military powers have recognized the game-changing potential of IoBT and launched large-scale development programmes. The Integrated Tactical Network of the United States Army provides the army with wearable gadgets and powerful communication technologies to keep the soldiers connected even in hostile zone situations.[10] China is heavily investing in what it calls smart warfare, centred on linking sensors across different domains.[11] To make sure that forces of member nations can exchange data and work cooperatively in the course of coalition missions, NATO has devised the Federated Mission Networking system.[12] At the regional level, other countries such as India also implement the concepts of IoBT in accordance to their requirements, which proves that efficient battlefield networking could be attained using resources of various quantities in case of proper priorities.[13]

Tactical Relevance of IoBT

Wearable Sensors: Individual personnel can become constant nodes on the battlefield network through soldier-borne technologies, turning them into periodic reporters of information. According to the *Journal of Military Technology*, position tracking systems like GPS can decrease incidents of fratricide up to 80 percent during complex terrain operations and allow more accurate coordination of maneuvers.[14] With its multi-ethnic settings, the city to the hill tracts, in Bangladesh, familiarity with the precise places of friendly forces is particularly useful to keeping units intact. Health tracking devices are used to monitor vital signs in soldiers and commanders can tell when soldiers are about to be heat-damaged or dehydrated, before it leads to debilitation.

Autonomous Systems: Unmanned platforms increase the range of capabilities and the reach of the IoBT networks and provide a lower risk to personnel. Even entry-level tactical UAVs offer 300 percent greater surveillance coverage than the older techniques of observation do.[15] Unmanned ground vehicles also complete dangerous missions, such as explosive ordnance clearance or reconnaissance of closed areas. Sensor deployment systems are deployed to locations inaccessible to soldiers and this provides a constant eye on the environment, without requiring a human to be present to monitor the area - a feature that is highly prized when patrolling the border.

Tactical Data Processing: Pattern recognition systems can be used to process sensor data to detect anomalies or certain signatures of threat activities. According to the *International Defense Review*, in recent field trials, advanced tactical data processing decreased threat detection times by 65 percent.[16] This feature is especially useful in complicated situations like those in cities or responding to a disaster when many factors work together at the same time. Decision support tools offer processed information in a format that allows quick comprehension to assist human judgment and improve information processing.

Edge Computing in the Field: Distributed processing capabilities enable tactical units to process information on the ground, eliminating the need to depend on tenuous communication connections to the headquarters. A comparative case study of network architecture showed that edge computing designs retained 87% critical functionality in the case of communications disruption versus only 34% of the centralized processing models.[17] The effects of this local processing and transmission of only needed information instead of the raw sensor feeds are known as bandwidth optimization.

Implications of IoBT for Bangladesh Army

Urban Warfare: IoBT is tactically beneficial to the units of Bangladesh Army that operate in the densely populated cities such as Dhaka, Chattogram and Sylhet. Small tactical drones can be used to reconstruct multi-story structures prior to the admission of troops, minimizing the exposure of personnel to danger at the same time as offering insight into building strategies and occupancy. Such possibilities are especially applicable to the urban centres of Bangladesh, where small streets, overcrowded residential zones and complicated infrastructure systems present difficult working conditions. Those technologies would increase the efficiency of the Army in security operations with the possibility of minimizing civilian disruption and property damage.

Jungle Warfare and Counterinsurgency Operations: In Chattogram Hill Tracts (CHT), triple-canopy jungle and steep terrain around Khagrachari, Rangamati and Bandarban severely limit situational awareness during Security Forces (SF) operations. IoBT offers practical solutions for these constraints. Offline GPS mapping applications on ruggedized tablets or smartphones provide patrol navigation in areas without mobile coverage, particularly near Bangladesh-India-Myanmar border.[18] Low-power mesh radio networks with portable ridge-mounted repeaters create communication bubbles in valleys where traditional radios fail, enabling head-to-head contact between separated elements. Basic unattended ground sensors along established movement corridors and river crossings provide early warning without continuous observation posts. Blue force tracking systems transmit encrypted position data intermittently, maintaining command awareness of patrol locations despite limited direct communication. These capabilities address the persistent challenge of unit cohesion and orientation in terrain where visual contact between team members is frequently lost, enhancing operational effectiveness while reducing the personnel footprint required for area security.

Disaster Management: The disaster vulnerability of Bangladesh requires certain IoBT military applications. Integrating with Flood Forecasting & Warning Centre (FFWC) data systems provides the units with real-time water level and inundation predictions to pre-position resources in time.[19] IoBT solutions between Bangladesh. Meteorological Department (BMD) cyclone tracking and tactical units facilitate evidence-based deployment decisions by commanders. Portable weather stations and water-level sensors complement national monitoring networks in flood-prone haor areas as well as coastal districts and send localized information to both the military command posts and Disaster Management Information Centre (DMIC). Such capabilities enable Bangladesh Army disaster response through reliable communications and situational awareness where commercial networks are lost, especially in chronically vulnerable districts with flooding in the north-eastern and coastal areas.

UN Peacekeeping Missions: As a leading UN peacekeeping contributor, Bangladesh benefits from IoBT capabilities enhancing mission effectiveness and personnel safety. Integrated perimeter security combining ground sensors, cameras and autonomous platforms provides early threat alerts while reducing physically deployed forces.[20] UN Department of Peacekeeping Operations (UNDPKO) classifies these as essential enablers for resource-limited, high-threat missions. Convoy protection systems with networked tracking, route surveillance and threat detection are vital for Bangladesh contingents in Mali and Congo where ambushes threaten. These capabilities improve mission efficacy, personnel safety and will demonstrate technological capacity of Bangladesh Army in international operations.

Bangladesh Army Way Forward

The successful application of the use of IoBT should be a deliberate, gradual approach to change, which considers both technical and organizational dimensions of change. The proposed roadmap proposes a deliberate capacity building method that favours both short and long-term institutional change in terms of short-term operational benefits.

Phase 1: Foundation Building (Short Term): First stage is to prepare the required conditions to implement IoBT by developing the doctrine, training organizational members and testing capabilities through pilot projects as mentioned below:-

- Create an IoBT Centre at Army Training and Doctrine Command (ARTDOC) as the centre of concept development, testing and training.
- Create a broad of IoBT doctrine, Tactics, Techniques and Procedures (TTPs) by evaluating existing publications in a systematic fashion.
- Introduce pilot projects in three areas of priority:
  - Border security sensor networks across a selected 5–10-kilometre segment.
  - Infantry company modernization with position tracking and tactical communications.
  - Logistics management systems within a brigade to support each of the battalions.
- Establish formal academic collaborations with Military Institute of Sciences and Technology (MIST) and Bangladesh University of Engineering and Technology (BUET) with a special emphasis on applied research.
- Adopt effective security models, which focus on cybersecurity, physical security and operational security needs.

Phase 2: Capability Expansion (Mid-Term): The second stage expands implementation using pilot experiences as they build up special knowledge and skills:

- Expand successful pilot projects to full operational size, depending on the results of the evaluations.
- Create special IoBT training in the Signals Training Centre & School (STC&S) and other pertinent institutions.
- Build local manufacturing capacity with the technology industry in Bangladesh in public-private venture.
- Uniformly include acquisition strategies, which require capability and security issues as well as resource limitations.
- Develop cooperative doctrine on the use of IoBT in multi-service operations which is tested during mutual exercises.

Phase 3: Institutional Integration (Long Term): The last stage entails institutionalisation of the capabilities of IoBT to achieve sustainability and further evolution as outlined below:-

- Include IoBT situations in major training and command post simulations.
- Inculcate ongoing modernization initiatives where capability is reviewed frequently.
- Establish technical careers among officers and soldiers that have a high level of IoBT expertise.
- Carry out overall performance indicators of technical and operational performance.
- Create formal innovation initiatives that seek ideas throughout the force to apply to novel uses of the IoBT.

Challenges and Limitations

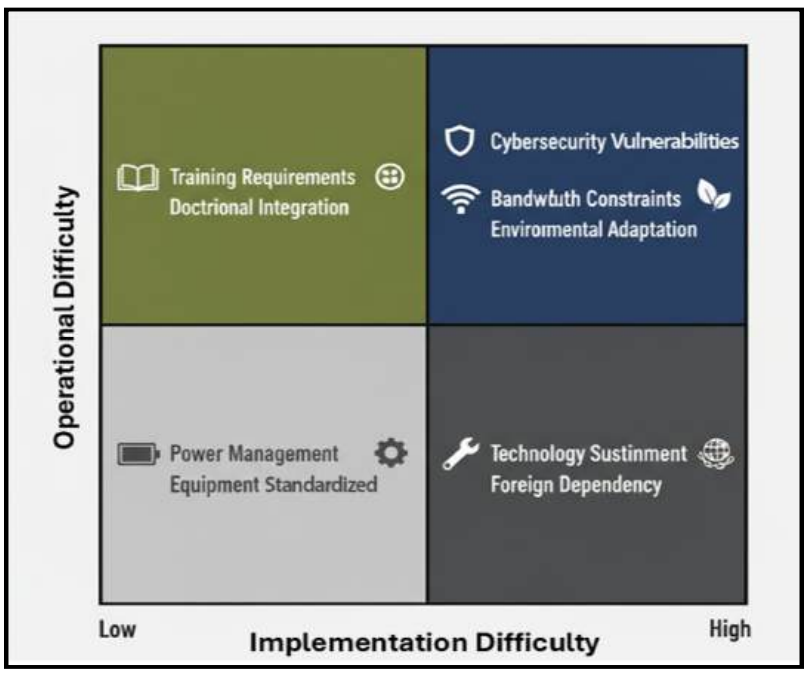
Technological Challenges: IoBT implementation faces bandwidth constraints, particularly in remote areas with limited infrastructure. Proliferating sensors generate data volumes that can overwhelm communication channels. A technical evaluation found existing Bangladeshi networks support only 30-40% of the data throughput needed for comprehensive IoBT adoption without significant upgrades.[21] Cybersecurity risks increase with each networked device potentially introducing new attack vectors. Interoperability challenges arise when integrating diverse systems across domains, services and multinational partners. Technology sustainment requires ongoing maintenance, software updates and eventual replacement as capabilities evolve.

Operational Challenges: Training requirements extend beyond basic operation to tactical employment, problem-solving and integration with broader operational concepts. Studies identified that effective IoBT utilization requires substantial changes to current training programmes and new technical specialties.[22] Doctrinal integration faces challenges related to organizational culture and established procedures. Systems those impose excessive cognitive

burden may degrade rather than enhance operational performance. Change management presents significant challenges in traditionally hierarchical military organizations.

Strategic and Environmental Problems: Climate poses significant challenges to electronic equipment in Bangladesh. High temperatures and humidity lead to component failure, reduced battery life and shortened operational lifespan. *Defence Technology Journal* reports electronic equipment failure rates increase 35-50% in monsoon conditions without proper ruggedization.[23] Diverse topography of Bangladesh necessitates flexible rather than uniform solutions. Strategic acquisition challenges include cost, foreign dependency and export restrictions. Data sovereignty concerns arise when sensitive information passes through networks with foreign elements. Electronic warfare represents a critical vulnerability as adversaries develop increasingly sophisticated capabilities to disrupt communications and intercept transmissions.

Figure-2: Challenges Matrix of IoBT



Source: Author's self-construct

Conclusion

The adoption of IoBT to Bangladesh Army is an opportunity to evolve and improve the tactical performance of the army in varying missions. As revealed in this paper, IoBT technologies provide immense benefits to battlefield awareness, action speed and coordination that can directly be converted into better battlefield capability. With regard to Bangladesh Army,

in particular, these capabilities are responsive to operational needs at the entire range of missions, both conventional defence and counterinsurgency, disaster responses and UN peacekeeping operations.

The challenges noted in the implementation process require a planned, step-by-step solution instead of bringing about an all-time transformation. The operational environment in Bangladesh is distinctive and it demands specific solutions that cannot be directly applied by borrowing systems that were developed in other settings. Technology alone, will not provide the expected benefits, but instead, it will provide new weaknesses unless supplemented by the proper doctrine, training and organizational adjustments.

The implementation roadmap proposed in the three phases provides a realistic way forward that will ensure that the capabilities are increased without compromising sustainability and security. Through focus on indigenous research collaboration, defined pilot projects and holistic security systems, Bangladesh Army will be able to build IoBT that are truly suited to national requirements rather than dependent on foreign solutions. As regional security dynamics continue to evolve, this measured approach to battlefield digitization will position Bangladesh Army as a technologically capable, resilient force able to execute its diverse mission set with greater effectiveness and efficiency.

Recommendations

Based on the analytical evaluation, as well as on pragmatic evidence provided in this paper, the following recommendations are put forward to be considered:-

- Instill end-to-end security models at the very beginning of the IoBT creation life cycle, including the principles of zero-trust and security measurements, along with verification of the supply chain and regular vulnerability auditing.
- Design equipment requirements and test specifications with particular attention to the climate of Bangladesh in order to prove reliability in the real operating conditions.
- Focus more on solutions that can be sustained and supported by the current resource limits and not over-relying on complex systems that can be unsustainable.
- Invest in specialization of training and knowledge management systems that develop technical skills needed in effective usage of IoBT.
- Make sure that technology supplements instead of supplants key military capabilities and consider the need to remain effective in degraded operations.

Notes and References

1. Zhu Lin et al, 'An Invisible Warfare with the Internet of Battlefield Things: A Literature Review,' *Human Behaviour and Emerging Technologies*, Vol.3, No.2, 2021, pp.255–260.

2. International Institute for Strategic Studies, *The Military Balance 2023*, London, First Edition, 2023. Available at: https://doi.org/10.4324/9781003400226.

3. Chuchu Qiu et al, 'Research on Digital Battlefield Atlas Based on Big Data,' *8th International Conference on Big Data and Information Analytics (BigDIA)*, 2022, pp.461–465 Available at: https://doi.org/10.1109/ BigDIA56350.2022.9874096.

4. Kent Byus, 'Observe, Orient, Decide, Act: A Subjectivist Model of Entrepreneurial Decision Making,' *Journal of Managerial Issues*, 2018, pp.349–362.

5. R. Douglass et al, *IoT for Defense and National Security*, Hoboken: John Wiley & Sons, Inc., 2022, available at: https://onlinelibrary.wiley.com/doi/book/10.1002/9781119892199.

6. Alexander Kott et al, 'The internet of battle things,'*Computer*,Vol.49, No.12, 2016, pp.70–75.

7. Shounak Sushil Savant and S. Sharma, 'The Role of Internet of Battlefield Things in Modern Warfare: A Cybersecurity Perspective,' *International Journal for Research Publication and Seminar*, 2024. Available at: https://doi.org/10.36676/jrps.v15.i3.1534.

8. Wang Yang, 'The Internet of Things and Its Military Applications,' *Journal of Military Communications Technology*, 2011. Available at: https://en.cnki.com.cn/Article_en/CJFDTOTAL-JSTY201101016.htm.

9. Martin Révay and Miroslav Líška, 'Network Centric Warfare and OODA Loop,' *2023 Communication and Information Technologies (KIT)*, 2023, pp.1–6. Available at: https://doi.org/ 10.1109/KIT59097.2023.10297048.

10. Syed R. Ali and R. Wexler, 'Army War Fighter Network-Tactical (WIN-T) Theory of Operation,' *MILCOM 2013 - 2013 IEEE Military Communications Conference*, 2013, pp.1453–1461, available at: https://doi.org/10.1109/MILCOM.2013.246.

11. Elsa B. Kania, 'Artificial intelligence in China's revolution in military affairs,' *Journal of Strategic Studies*, Vol.44, 2021, pp.515–542. Available at: https://doi.org/10.1080/ 01402390.2021.1894136.

12. Hrabovský Buřita and Novák Pohanka, 'Systems Integration in Military Environment,' *Advances in Military Technology*, 2020. Available at: https://doi.org/10.3849/aimt.01334.

13. N. Behera, et al, 'Futuristic person re-identification over internet of biometrics things (IoBT): Technical potential versus practical reality.' *Pattern Recognition Letters*, Vol 15, 2021, pp 163-171. https://doi.org/10.1016/J.PATREC.2021.08.007.

14. Mihai Stoica and Mihai Coca, 'GPU-Based Normalized Compression Distance for Satellite Images,' *Journal of Military Technology*, Vol.5, No.1, 2022, pp.49–54. Available at: https://doi.org/ 10.32754/jmt.2022.1.07.

15. Jeihee Cho et al, 'Towards Persistent Surveillance and Reconnaissance Using a Connected Swarm of Multiple UAVs,' *IEEE Access*, Vol.8, 2020, pp. 906–917, available at: https://doi.org/10.1109/ACCESS.2020.3019963.

16. Naveen Edapurath Vijayan, 'Real-Time Cyber Threat Detection Using Big Data Analytics: A Scalable Framework for Immediate Threat Response,' *Journal of Engineering and Applied Sciences Technology*, 2024. Available at: https://doi.org/10.47363/jeast/2024(6)e171.

17. Keyan Cao et al, 'An Overview on Edge Computing Research,' *IEEE Access*, Vol.8, 2020, pp. 714–728. Available at: https://doi.org/10.1109/ ACCESS.2020.2991734.

18. Rishav Mallick et al, 'Active Convergence of the India-Burma-Sunda Plates Revealed by a New Continuous GPS Network,' *Journal of Geophysical Research: Solid Earth*, Vol. 12, 2019, pp. 155 - 171. https://doi.org/10.1029/2018JB016480.

19. Flood Forecasting and Warning Centre, Bangladesh, available at: https://www.ffwc.gov.bd/ , accessed on 09 September 2025.

20. Pedro Teixidó et al, 'Secured Perimeter with Electromagnetic Detection and Tracking with Drone Embedded and Static Cameras,' *Sensors*, Vol.21, 2021. Available at: https://doi.org/ 10.3390/s21217379.

21. Hasan Shahriar et al, 'Exploring Internet of Things adoption challenges in manufacturing firms: A Delphi Fuzzy Analytical Hierarchy Process approach,' *PLOS ONE*, Vol.19, 2023. Available at: https://doi.org/10.1371/journal.pone.0311643.

22. Tanya Singh and Jazmin A. Reyes-Portillo, 'Using Technology to Train Clinicians in Evidence-Based Treatment: A Systematic Review,' *Psychiatric services*, 2020. Available at: https://doi.org/10.1176/appi.ps.201900186.

23. Charith Silva and M. Saraee, 'Electricity Distribution Network: Seasonality and the Dynamics of Equipment Failures Related Network Faults,' *Advances in Science and Engineering Technology International Conferences (ASET)*, 2020, pp.1–6. Available at: https://doi.org/10.1109/ASET48392.2020.9118274.

Brief Biography

Captain Tanvir Ahmed was commissioned from Bangladesh Military Academy (BMA) with 83rd BMA Long Course in the 28th Bangladesh Infantry Regiment on 04 December 2022. He has successfully completed mandatory military courses, including the Officers' Basic Course (Infantry), Basic Commando Course and Officers' Weapon Course from the School of Infantry and Tactics (SI&T). Academically, he has achieved a Bachelor of Business Administration (BBA) degree from Bangladesh University of Professionals (BUP). In his professional career, he held various regimental appointments, including Intelligence Officer (IO), Support Platoon Commander and Acting Quarter Master of an Infantry Regiment. He is currently serving as the Adjutant of 28 Bangladesh Infantry Regiment.

Command and Control Aspects of Blended Conventional and Unconventional Warfare in Bangladesh Army

Captain Emon Ahamed, Artillery

Abstract

The concept of blending Conventional and Unconventional Warfare came in limelight in Bangladesh Army in 1997 with the publication of Draft Operations of War, Volume-1. The proposed concept has been a major breakthrough in the defensive strategy and tactical doctrine of BD armed forces. The aspect of Command and Control in this blending environment is still in its nascent stage and needs to be refined after due deliberations and practical training. This study is an attempt towards highlighting and recommending various options of Command and Control in blended environment of Conventional and Unconventional Warfare in Bangladesh Army.

Keywords*: Command and Control, Conventional Warfare, Unconventional Warfare, Force Generation, Battlefield Fluidity, Logistics.*

Introduction

Bangladesh's geo-strategic location demands that needs to maintain a sizeable army for the protection of its sovereignty and territorial integrity. Economically, however, it is not viable to increase our present force structure. To strike a balance between these two opposing aspects, our present operational plan suggests a Conventional Defensive Strategy for a limited period and then switching over to Unconventional Warfare (UW).

The concept of blending Conventional and UW has been in practice for many years. Throughout the history of warfare it is seen the unconventional methods multiply the achievements, often resulting in the collapse of the enemy nerve centres and severely injuring her softer targets. Karl Marx (1818-1883) was fascinated by UW and specifically advocated it as a means whereby a minority, a small force or a weak nation could hope to defeat a more powerful force over a period of months or years.[1] With the publication of *Draft Operations of War*, Volume 1 in 1997 the concept of blending conventional and UW was floated in Bangladesh Army. Although the proposed concept in defence strategy has been a major breakthrough, yet a series of follow up actions are awaited.

The aspect of Command and Control (C2) in blending environment needs to be comprehended well to avoid confusion and disorder. A well understood concept of command needs to be delivered to the subordinates along with a clear control arrangement.[2] This is to be practiced during peacetime. For unorthodox method of operation in warfare, mission oriented C2 system to be put into operation. An elaborate Standing Operating Procedure (SOP) to be developed

and set into practice, which will enable the Unconventional Force (UF) commander to operate effectively and independently.

When both Conventional and UW are integrated together for a common objective, it is termed as blending. A surprise attack behind enemy lines by Conventional Forces (CF) alone or a large-scale attack by UF without conventional support does not mean that the two methods have been blended. To tie UW with the conventional effort, two things are essential.[3] First, there must be an organizational framework within which the UF must operate. Second, a well-established chain of command must exist between the conventional and UF to issue and execute orders.

The C2 of UF and their proper employment will be a challenging task for the leadership at all level. Without proper C2 management, the whole effort may well become a fruitless exercise. Moreover, in the blended environment, a superior aggressor has to be dealt with creative tactics and operational art. This will warrant a flexible C2 set up for effective direction and guidance.

This paper has attempted to address the concept of blending Conventional and UW in brief. It has highlighted the force generation and likely organisational structure in short. This has mainly focused on the concept and modalities of C2 aspects in blending Conventional and UW. At the end, an effort has been made to discuss the logistic system including the likely logistic command in the blended environment.

Concept of Blending Conventional and UW

The concept of blending Conventional and UW is not a new kind of warfare. Armed forces throughout the history of warfare have been practicing it. UW goes much further back in history than Conventional Warfare (CW). The action of individuals who roamed the countryside, who looked for targets, who probed for soft spots or weak points in the lines of communication (L of C), who lived off the country as best as they could, who travelled constantly and never slept twice in the same place-stories and legends are told in the earliest records of mankind.[4] Bangladesh War of Liberation showed the classical concept of meshing the Conventional and UW together to achieve a great result.

Objective and Method of Blending

Objective: UW assumes greater importance in defensive operations as it significantly compensates the numerical disadvantage of the defending forces. It makes the theatre/ battlefield cellular by allowing simultaneous engagement of enemy forces throughout the length and breadth of the area of operation.[5] Therefore, the main objective of blending Conventional and UW is to compensate the numerical inferiority and lack of modern fighting assets of CF against potential adversary. It involves the population right from the beginning in the war operation.

Method: The concept envisages blending of Conventional and UW right from the beginning of hostilities as opposed to the present concept of transition into UW in the last phase of the war. The UF will carry out operations under the overall command of the CF Commander both in peacetime and war scenario.

A Synergistic Effect: To achieve desired leverage over the enemy all the actions at operational and tactical level must be synchronized. Simultaneous operations throughout the front and depth of the Area of Responsibility (AOR) have to be synchronized to create fluidity. Deep reconnaissance, long-range fires, air mobility and UFs will blur the distinction between rear and front.[6] All these operations will be executed to offset the enemy's decision-making cycle. If well-coordinated, the actions at the enemy's rear will supplement the conventional battles along the front line. As such, UW needs to be integrated in the divisional operational plans. Thereafter, the plans should be put to test during winter/summer training.

Identifying Both Enemy and Own Centre of Gravity: In case of an aggression by the potential enemy, the threat's strategic Centre of Gravity (CG) is likely to be, "popular support and his diplomacy to carry international support for war effort." Own strategic CG may be identified as "capital Dhaka, maintaining peoples' support, continuous supply of arms and ammunition and maintaining C2 arrangement." To achieve victory, it is to tilt enemy's necessary CG and protect own. To effectively tilt enemy's CG, one need to cause large-scale casualties right from the beginning in terms of men and materials. This is possible by taking the battle into enemy's territory from the outset of hostilities.[7]

Force Generation and Organisational Structure

Force Generation

Concept: Blending of Conventional and UW and simultaneity of their application will necessitate expansion of the present force structure. To conduct simultaneous operations of both conventional and unconventional a large proportion of force has to be made ready. But at present Bangladesh Army formations lack required strength for conducting CW. Therefore, only from the army, generating UFs will be difficult. As such, Police, Ansar and Village Defence Party (VDP), Bangladesh National Cadet Corps (BNCC), retired servicemen and the people have to be integrated in the UFs.

Integration of People: It may be assumed that before and during the war a good number of volunteers would join the cause for the motherland. These volunteers would provide the required assets in terms of UF expansion, skilled and unskilled work force. Among them, a selected portion will be taken for UF and given some elementary military training. To fulfill the vacuum in UFs, a small pool of UFs will be maintained. They would be given basic military training like the regular forces.

Reservist Policy: The retired defence personnel can play the vital role in organising the UFs. Since there is no well-defined reservist policy so there are limitations in utilising these huge resources to form UFs. Bangladesh reservists consist of old men who retire at the end of their service career. It is the need of the hour to revise our reservist policy vis-à-vis the intake policy. Upon intake a soldier may serve voluntarily for five to seven years; after which only selected/competent individuals will be retained with the CF and others will form a major part of UFs. By this, the reserve pool will be younger and larger and that would be right choice to form the UFs.

Organisational Structure

The UF will be organised as an adjunct to the CF as per the district. These forces will be organised in company strength but with the capability to operate in sections and platoons. Since they will be operating over widely dispersed areas, the C2 arrangement has to be effective. Composition and size of UFs is the most important aspect in the concept of blending. Already it has been highlighted that the UFs would be a mixture of regular, auxiliary forces and the populace. The UFs may be of greater strength than CF.[8]

Organisational Setup: Both in peacetime and war, there must be a permanent organisational set up and established chain of command for the UFs. The overall responsibility of raising, structuring, training and C2 will remain with military divisions.[9] To issue and coordinate all their operations there will be an UF branch in every division. This branch will have three staffs headed by a Grade-1 Staff Officer. They will establish close coordination with the District Commanders. The basic structuring of UFs will be organised as per district. During peacetime these organisation will be only having the nucleus. The District Commander will be a posted Lieutenant Colonel/ Major. He will have a skeleton HQ with 10/12 staffs and organise a District Command HQ. The District Commander will be responsible for organisation, training and logistics of UFs to respective Brigade/Sector Commanders. He will receive orders/instructions from brigades/sectors and at times from divisions as well.

Challenges Facing C2 Aspects in Blending UW

Organizing and Employment of Forces: The process envisaged for creating UF from local people, retired defence personnel and VDP will be a huge and difficult task for the command echelons of regular forces. Since the force will not remain in cantonment during peacetime under direct supervision of a functional commander as the regular forces, it will demand an effective command structure to organize such a force within a short time to complement the task of regular forces. The District Commander would require huge effort in respect to structuring, communication, training, logistics and motivation of these UFs. District HQ needs continuous planning and supervision of the UFs in order to integrate these into divisional plan. Having accumulated and organized the UF, the next challenge for the overall

commander will be to train, equip and induct them in the war. Massing of huge raw manpower will not pay enough dividends rather will only inflate the statistics and make the command climate more difficult. Smaller forces with better training, equipment and above all effectively led will be better than an inadequately trained and equipped big force. Unleashing such an effective UF meshing general people and reservists and seasoning them to work under existing command structure will require tremendous coordination and command effort to make it successful.

Maintaining Fluidity in the Battle: The concept and design of successful unconventional effort are primarily based in creating fluidity throughout the length and breadth of enemy column. The main purpose of fluidity is to eliminate the traditional 'front' and 'rear' concept from the battlefield. The idea should be to engage enemy forces wherever one can reach out. Selection of high value targets at the front, flank, rear and deep inside enemy territory, allotting those to suitable UF and finally simultaneous execution of the task to complement with the development of conventional operation are essential prerequisite for creating fluidity. Fluidity demands widespread and simultaneous unconventional operations with high frequency concurrently with conventional effort. All these tasks will put enormous pressure on the command and coordination spectrum of the operational force. Command structure and its environment in UW should have sufficient elasticity to sustain such stress.

Non Linear Engagement: In blended method, all enemy forces committed in the battlefield must be engaged simultaneously irrespective of their relative position to the front line. This necessitates widespread operations throughout the length and breadth of the enemy column. Non-linear engagement and fluidity saturates enemy's C2 system with a surge of events that make the enemy commander incapable of taking timely and right decisions. The main effort should be to force the enemy to increase his resources for securing his L of C and rear echelons. On the contrary, the amount of efforts needed at command and staff level of own force to create such a fluidity through simultaneous and non-linear engagement may paralyze own command structure, if it is not modified to absorb the pressure of such high intensity tasks. To operate on various parts of the enemy column demands quick decisions at command level and rapid movement of UF in the battlefield. This will obviously call for a smooth command channel and an efficient staff work at all headquarters involved in these operations.

Deep Battles: UF will have to operate deep inside enemy territory, away from the support of own forces. Planning, coordination, execution, logistic support and integration of their operation with conventional effort and finally safe extrication of this isolated force will ask for detail coordination and necessary support from CFs. This shall put extra burden on command and logistics echelons of conventional organisations.

Complexity of Simultaneous Operation: In a blended atmosphere each action by the UFs must be examined against its bearing on the overall mission of the command. The plan of

UFs must mesh well with the existing CW plan. This calls for simultaneity of both unconventional and conventional operations. Existing command and communication set up of Bangladesh army needs to be modified to be compatible to plan, integrate and execute results on both the forces in order to achieve common mission.

Need for Coordinated Effort: The achievement of both unconventional and conventional operations must culminate towards the overall mission of the war. Sporadic and indiscriminate operations by UFs will hardly have any worthwhile effect on conventional effort. Though unconventional effort alone cannot bring any decision in the battle but their activities must create a condition for the CFs to achieve a decision. To seek a decisive impact of both the operations, farsightedness in planning, employment, coordination in timing and execution are required at the command and staff levels.

Need for Flexible Logistic Plan: As unconventional operations will entail fluid environment, speedy mobilization, swift engagement and speedily reacting with development of the situation, a flexible logistic plan mainly relying on civil resources should be planned and executed. Integration of civil resources for logistic support of such a dynamic force will demand liaison and coordination with civil authorities on the part of logistic staffs and freedom of action at the lower levels of command.

Dynamics of Effective C2 System of Blending UW

Effective Organizational Structure: The major problem confronting a theatre commander will be to generate and maintain a sustained flow of UFs in the war. As force generation and organization of UFs will be a critical task, an organizational structure therefore, should exist to raise the maximum UFs within a minimum time. This organizational structure should include command elements ranging top to bottom, coordinating branch with necessary staff and personnel, communication arrangement and finally grouping of manpower in various groups and sectors. This organizational structure though will be covert during peacetime but should be put into practice during training and exercise to study its feasibility and modified, if necessary as per the situation. Adhoc basis should be avoided as far as possible, dedicated personnel and branch should be organized with a responsible chain of command. Pre-listing of personnel as per desired organizational structure and pre stocking of weapon, equipment and necessary administrative items will expedite the force generation and mobilization.

Effective and Flexible Communication System: The very nature of blended environment and modus operandi of conducting concurrent conventional and unconventional operations clearly demand a very flexible and effective communication system for better C2. Much talked about fluidity, nonlinear engagement, simultaneity of operation pertinent to successful conduct of UF will necessitate a multidimensional communication system. A reliable and

stable link should exist between unconventional command echelon and overall command channel. Although it will not be possible to spare required communication equipment for UFs but following guideline should be observed to set up an effective communication system for better C2 in blended environment:

- A stable and permanent link between command echelon of both conventional and districts level UF HQ.
- A very flexible and quick communication arrangement at lower level of UF using all local resources.
- Integration of population in the communication system as far as the security parameter allows.
- Duplication of communication systems during peace and war.
- Administrative and less sensitive information through improvised and local means while sensitive and high security valued information to be passed by secured means.

Effective Use and Integration of Civil Resources: As the UFs will start functioning in an emergency or a few days prior to the war and since they are devoid of conventional administrative and operational set up, the force will have to rely on support of population and civil organizations. There arises the need for integration of civil resources for better C2 in blended environment. This integration should not only aim for smooth logistic back up but also should range from local authority's help to organize and mobilize the enlisted personnel of UF. Integration plan should include all minor details to expedite the operational and logistic support for effective employment of unconventional effort.

Peace Time Training and Cohesion: The multitude of challenges to effective C2 arrangement of UF, focuses on the need for an integrated training and building up of peacetime cohesion. The concept of blended operation envisages an inert force to be steered within a short span of time. Therefore, it needs hard training and peace time inter and intra force cohesion between both Conventional and UFs. Effective training and cohesion will ease the C2 effort to regulate such a large force to operate over a wider area. Stated below are few of the suggested considerations for effective training and cohesion in blended operational environment:-

A small package of 'Food for Training' can be conducted for selected local youths from 3-4 Thanas under divisional responsibility. This will be considered as their basic training. After active participation for 2/3 years in UF company, most eligible youths may be absorbed in the Army. This will create lot of enthusiasm among local unemployed youths.

Responsible command echelon, company and Platoon Commanders of UF company should be oriented with regular units during UW exercise, winter training or through any other field training exercises/activities.

Contemplated Mobilization Problem: The toughest challenge that C2 elements of UF will face is mobilization and integration problem. To offset the complexity a well-conceived and contemplated mobilization scheme should be formulated. The scheme should include the following:-

- Arming and equipping the force.
- Planning for their food, accommodation and other allied facilities during training and war.
- Authorization of food, medical facilities and other support through gazette notification.
- Provisioning of radio and communication system.
- Replenishment of arms and ammunition.
- Integrating both elements of regular and UFs at successive phase of battles.

Principles of Effective C2 System for UW

Mission Oriented Command and Control: Increased tempo of unconventional environment will require comparatively junior commanders to take initiative and decisions. This can be done if everyone operates within the framework of a common intent of the overall commander. The mission oriented C2 stipulates that commanders should give subordinates general direction of what is to be done and allow them freedom of action to determine how to do it. Three factors that are important for fostering such C2 system are, the characteristics of the leader, a sound method for issuing and implementing order and the development of trust between the commander and subordinates.

Unity of Effort: Unified actions by both conventional and unconventional segment under a single overall command will aid to the success of blended operations. This will ask for synchronization, standard doctrine, tactics and techniques and finally SOP which will make the command and coordination easier than what it would have been in absence of these. Appropriate organizational climate within the command is to be created by fostering the spirit of accepting responsibilities, delegating authority to the subordinates, promoting risk taking and fixing accountability at appropriate level.

Improvisation: Improvisation is sine qua non for successful UW. All commanders especially at lower level should emphasize on improvisation to reduce task load on command echelon. Improvisation calls for creativity in fulfilling the needs out of meagre resources. More often than not, the commanders of UF will find themselves in a state of critical deficiency or deviation from what is standard. A dynamic commander can overcome such situation with

creative improvisation. The bottom line is to do more with less. This will be one of the packages during basic as well as subsequent training. UW Company Commander's focus should be to utilize maximum of his resources during war.

Command and Control Structure

C2 of UF and their operations will be a challenging task for the leadership at all levels. Without proper C2 management, the whole thing will become a fruitless exercise. There are three options with regard to the chain of command which are briefly discussed below:-

Option-1: In this option, the UFs will conduct operations independently within their own AOR. The Division Commander remains the highest commander to control and coordinate the unconventional operations. Separate commanders at sector and below level will be designated to organize, plan and conduct unconventional operations maintaining separate chain of command. The main disadvantage however is the lack of coordination between the regular and the UFs.

Option-2: The UFs would operate under the overall operational framework of the formation. At division/brigade/battalion headquarters a dedicated branch/cell will provide staff support to the command to exercise operational control over the UFs deployed in their respective AOR. GSO-1 (UW) as chief coordinator working under the Divisional Commander will head the branch at Division Headquarters. A GSO-2 (UW) and a GSO-3 (UW) will assist him. This branch would work in close coordination with General Staff Branch of the division. At brigade level a GSO-2 (UW) and GSO-3 (UW) would look after the activities of UF deployed in the brigade AOR. The UW staffs at Brigade Headquarters would be posted as war increment and work directly under the Brigade Major. Further down at battalion level the Second in Command or Officer Commanding, Headquarters Company may be tasked to coordinate the activities of UFs. At district level, there would be an Army Officer (District Commander) who would organize and coordinate the activities of UFs deployed in the Upazilas under his district. He shall be responsible to Brigade Commander within whose AOR his district UFs operate. The commander of the company-sized force will be trained in the District HQ under District Commander. On mobilization, he will lead his company for the given task. The District Commander and the Company Commander will remain as permanent outfits and function both in peace and war. In addition to the vertical chain of command there will be a lateral chain of command between the District Commanders and the Brigade UW branch and between Thana and Battalion Headquarters UW cell.[10]

Option-3: In this option, the overall C2 of the UFs during peacetime and war will be exercised by the AHQ. UW Directorate will issue directives, plan and orders to all the divisions. In this option correct/judicial utilization of all the resources will be ensured. This option will also facilitate better training and management of the UFs. The emphasis in this option is on centralized control of these forces, being sensitive in nature any premature employment could jeopardize

operational security. The major disadvantage of this option is, since the battles will develop very rapidly along many fronts, therefore, it would be difficult to command at District level from AHQ. There will be tremendous difficulties in coordination and movement of forces aspects.

Analysis of Various Courses

Table-1: Comparison Matrix of Various Options

Serial	Factors	Weightage	Option 1	Option 2	Option 3	Remarks
1.	Effectiveness of command	C5	C2	C4	C5	
2.	Coordination	3	1	2	3	
3.	Communication	4	1	3	4	
4.	Required time to gain command after outbreak of hostilities	4	4	3	2	
5.	Grouping and regrouping of UFs	3	2	1	3	
6.	Feasibility in peacetime	3	1	2	3	
7.	Feasibility in Wartime	3	3	1	2	
Grand Total		**25**	**14**	**16**	**22**	

Source: Author's self-construct

Communication Arrangement

Communications with small groups operating across International Boundary (IB) is one of the most formidable challenges for all commanders. This will be further complicated when battle develops at depth. As such, these aspects need elaborate and detailed planning.

All UF companies operating across IB or inside own territory should use all indigenous resources to establish communication with their higher HQs. District Commander should have HF radio link with UW Company, battalion, brigade and division HQ. It should also have parallel communications through land/mobile network with all conventional HQs.

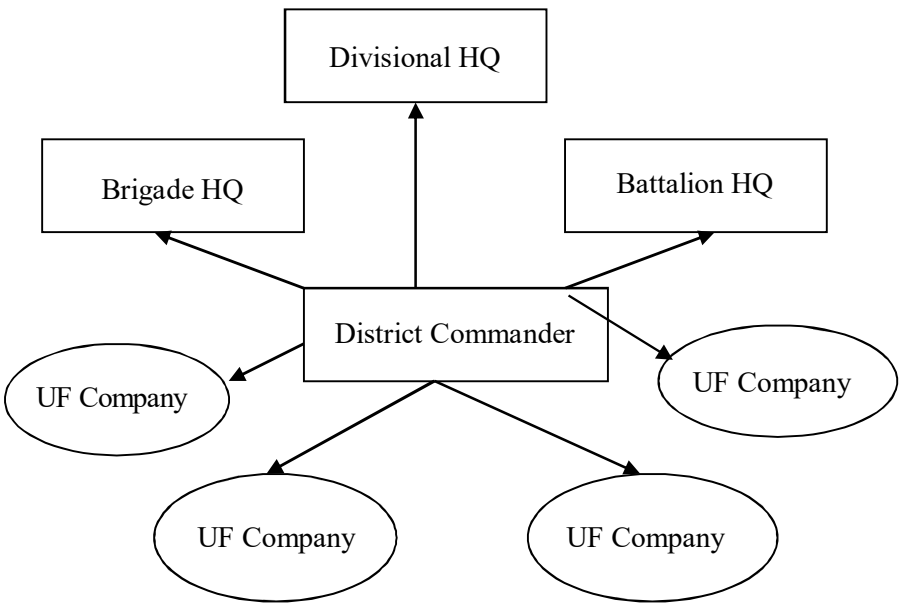
An elaborate communication network prior to deployment of UF certainly would give rapid transmission of orders and swift execution of the tasks. UF should resort to maximum improvisation and local knowledge. Unconventional communication means like 'gonoline'

(people's courier) and couriers by boat, bicycle, motorbike, engine boat etc. will also be employed to keep the communication functional. The suggested means of communication are HF wireless sets, gonoline system, human couriers, civil telephone exchange facilities and mobile phone networks**.**

A Suggested HF Communication Link

A suggested HF communication link in a blended environment is given below:-

Figure-1: **Logistic Command Channel**



Source: Author's self-construct

Principles of Logistics in UW

Decentralization: Dispersed disposition of the UFs elements will necessitate earmarking and making the logistic support available in their respective area of operation.

Pre-positioning of Stocks: Conventional procedure for maintenance/replenishment will not be equally effective in UW scenario. To make essential combat supplies readily available, sufficient stocks specially ammunition and explosives have to be pre-positioned in the pre-designated areas on the basis of the operational plan.

Dependence on Local Resources: Except for arms and ammunition, UFs in a particular area, will remain dependent on local resources in their area of operation for all logistic

requirements. Designated UFs must have prior assessment and liaison with civilian population and administrative authorities in their respective area of operations.

Co-ordination with Local Authority: UW will encompass participation and co-operation of local authority for procurement and distribution of supplies. This will also need the participation of local population. Early issue of government orders/notification to all agencies for total support during peacetime would remove difficulties in emergency or war.

Logistic Concept in UW

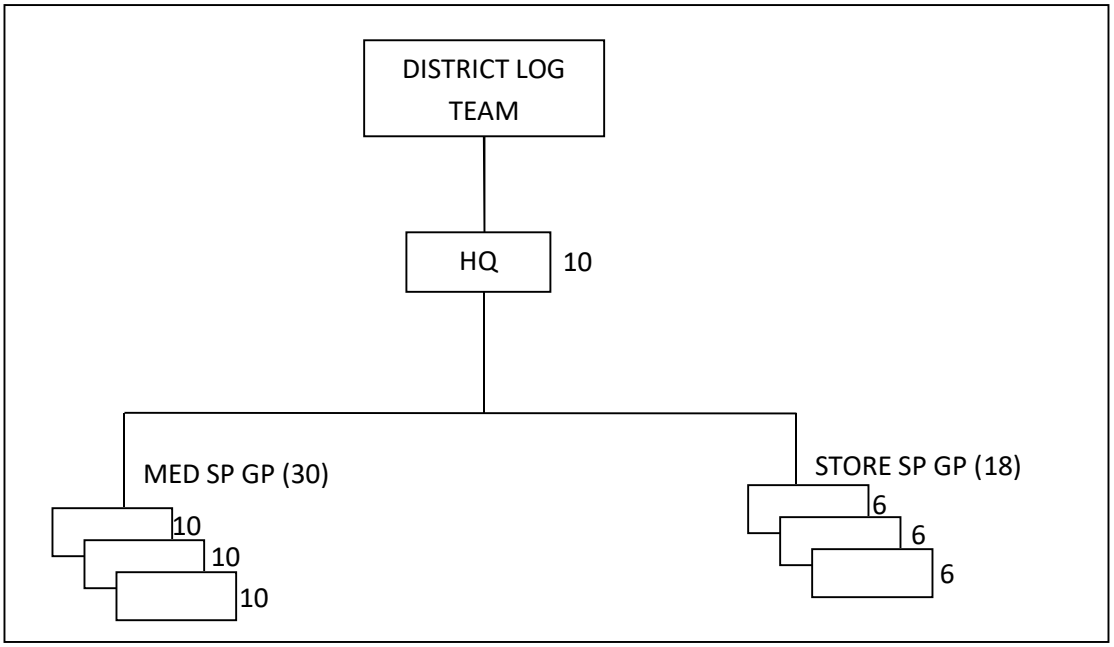
The logistics system needs to be decentralized except for some controlled stores. Formations concerned will work out on detail logistic requirement for UFs in respective area of responsibility in light of the operational tasks. Respective logistic services directorate at AHQ will compile all such requirements forwarded by formations and arrange for provision, procurement and distribution. On mobilization, earmarked stores/equipments for UFs will be transported up to administrative District/Upazila Headquarters level under respective formation arrangements. Upazila level UFs command element will make necessary arrangement for collection of stores/equipment earmarked for them.

Provisioning of logistic requirement for UFs will remain restricted to mainly arms, ammunition, mines, explosives, grenades et cetera. For other combat supply, medical, repair and maintenance and transportation, the UFs will depend on local resources. Sufficient quantities of ammunition will have to be stocked and explosives dumped in pre-selected areas. Maximum use of civil resources will be made without causing inconvenience to the people.

The Army Services Corps has limited scope of providing logistic support to UFs. The UFs could be provided with ration money for their daily provisions. Besides, the force is likely to have limited requirement of POL, which can be procured locally. Local civil/thana medical facilities can be utilized for necessary medical assistance to the locally organized UFs. Army Medical Corps may attach small medical team with the UFs, if found necessary in some cases.

Likely Logistic Command Organisation at District Level: The district logistic team will be responsible for receiving necessary stores and equipment for the UF force operating within their AOR. The likely organizational structure of district logistic team is shown below:

Figure-2: Organisational Structure of District Logistic Teams



Source: Author's self-construct

Conclusion

Looking back over the military history of the twentieth century, what were the fundamental, conceptual, operational and organizational factors that, during times of peace, gave rise to changes in how military organizations would fight future wars? How long did it take for individuals and organizations to move from a vague vision of a new or more effective way of fighting to mature capabilities they could exploit to underwrite success in actual combat? It is imperative on any modern military organization to continue to innovate and modify its doctrines in peacetime for better preparation when a conflict situation arises. The blending of Conventional and UW is a step, therefore in right direction. It is imperative to learn from the current and the past trends in warfare to be able to enhance own capability so that one is not found wanting when the need arises.

The geo-strategic location of Bangladesh, its size and changing nature of warfare in the modern times is a pointer to us to change with the times. In any future conventional conflict, it is imperative to use the vast population as a force multiplier to ensure territorial integrity and sovereignty as an independent nation. The blending of Conventional and UW, therefore is not a choice but a necessity. History bears testimony to the fact that smaller but suitably organized UFs have defeated large CFs. In any modern war, it is the peoples support, which determines the ultimate outcome of the war; without it no military force can continue the war. The USA had to

withdraw from Vietnam in 1973 and Somalia in 2021 because of negative attitude of the local people. In a war where the armed forces are blended with common masses for a joint effort, the nation as whole is involved at all echelons of the war effort. This is realistic and pertinent for countries like Bangladesh, whose military has less sophisticated weaponry, but has the important battle winning factor; the support of its vast population.

The concept of blending conventional and unconventional method of war is that the UW should not be considered as an aftermath of conventional war. To shape the battlefield and to gain any leverage over the enemy, all the actions has to be well coordinated with advance planning especially for target selection and execution. Simultaneous operations throughout the depth and frontage of the AOR have to be conducted to create fluidity. Synchronisation is the key to attain any result in UW. The UW though conducted in isolation behind enemy lines must have its effect felt on the conventional operations along the front. The UFs must take the battlefield to enemy territory and strike at the weakest point. As the enemy enters own territory the UFs should hit enemy's HVTs in considerable depth and flanks. UFs are also useful for the operational commander in terms of reconnaissance and target acquisition.

Blending of Conventional and UW and simultaneity of their application will necessitate integrated organisational structure as well as C2 set up. The UF will basically consist of regular forces, para-military forces and trained civilian personnel. Although the regular forces will comprise the nucleus of the UFs but modification suggested for force generation will surely enhance the combat power. Reservist policy is important to maintain, generating a large force in an emergency. The introduction of voluntary service for 4 to 5 years would give a better trained force as well as reservists. The civilian volunteers will provide the asset in terms of vast recruitment base for force expansion and transition to total people's war.

The UF will be organised similar to the CFs but will be lightly armed. These forces will be organised in company strength but should be prepared to operate in sections and platoons. These small groups are to be led by Army personnel. A comprehensive policy needs to be evolved in peacetime to integrate all the elements of UFs and their training. The formation HQ will be responsible for the UFs in their respective AOR. A reliable and suitable means of communication would be essential for UFs with the formation HQ. The District Command HQ will be responsible to liaison with the civil authority and training of the reservists, para-military and volunteers.

In Bangladesh Army, a division is the lowest and the highest formation that combines all arms and services and is organized to conduct operations on it's own. The division headquarters therefore is suitable for C2 overall UFs deployed in the area of responsibility. It is also at this level that sound plans can be drawn and coordinated for achieving the desired results. The present organization would however need some changes for correct employment of UFs. The training for this can also best be organized and conducted at the divisional level.

Providing logistics to UF will be a challenge in Bangladesh scenario. These forces will mainly depend on local resources. Ammunition, mines, explosive and armament may be pre-positioned in caches. The logistic cell of the UFs would coordinate subsequent re-supply. Unspecified and undesignated L of C will be used for this purpose. Professional and competent leaders at all levels can be a force multiplier and their training should get due attention. The CFs will impart training to UFs. In addition to basic military training, special training on subject pertinent to UW should also be provided.

The C2 of UFs and integration of their operations will be a challenging task for the leadership at all levels. Without proper understanding of the C2 management, the entire effort may not produce the desired results. Creativity and innovation in tactics will have to be encouraged so that superior forces can be defeated at the place and ground of own choosing. A well-conceived and articulated tactical doctrine can instill confidence and provide suitable guidelines to the military leaders who would have to put in place the essential elements of C2 in any future conflict.

Recommendations

The detail study on the blending Conventional and UW has brought forward the following important recommendations:-

- UFs should be organized on the basis of respective AOR of the divisions, with the C2 vested with the formations concerned. The summer and winter training events must be utilized to conduct and validate the concept and its feasibility in wartime situation.

- A debate should be generated on the feasibility of the C2 aspects to validate various options available for effective utilization of UFs.

- Once the concept matures to a level that it becomes suitable for implementation, the organizational set up may be established with due approval from the government. This must include necessary legislative formalities and budgetary allocation.

- A detailed scheme of mobilization, training, equipping, pay and logistics of this force must be set up and pursued relentlessly with a time plan.

- The force shall be provided with required communication facilities. HF sets may be authorized up to UW company level. Provisions should be made for using all the telecommunication and other facilities during peacetime training.

- An elaborate logistic policy for UFs should be formulated during peacetime. It should accommodate all contingencies of initial, defensive and final phases of the battles.

- All arms courses should include UW in course curricula. All aspects of UW including the role and its effect in various operations may be published as a General Staff Training Pamphlet.

Notes and References

1. Vo Nguyen Giap, *People's War People's Army*, New York: Bantam Books, 1968, p.54.
2. Lieutenant Colonel Abdullah Ashraf Yussuf, 'Command and Control Setup in the Blending Environment,' *Bayonet, Journal of School of Infantry and Tactics (SI&T)*, Jalalabad Cantonment, Sylhet, December 2001, Issue-6, p.25.
3. Draft GSTP Operation of War Volume One, pp. 9-27.
4. Vo Nguyen Giap, *op.cit.*
5. Draft GSTP Operation of War Volume One, pp. 11-12.
6. *Ibid*. pp 1-8.
7. 'Blending Conventional and Unconventional Methods of Operations is one of the Battlefield Imperatives. How Can Bangladesh Army Fit in this Imperative in Our Fighting Concept?' AHQ Project Study by 46 Independent Infantry Brigade 1998. p.12.
8. Draft Doctrine on Blending Conventional and Unconventional Warfare, November 2002, pp.1-8
9. *Ibid*.pp.9-29.
10. *Ibid*.pp.6-10.

Brief Biography

Captain Emon Ahamed, Artillery was commissioned in the Corps of Artillery on 06 June 2023 with the 84th Bangladesh Military Academy (BMA) Long course. The officer has completed his graduation in Bachelor of Business Administration (BBA) from Bangladesh University of Professionals. He served in a variety of staff appointments as Adjutant, Quartermaster and Mechanical Transport Officer in 11 Self Propelled Regiment. Other than mandatory courses the officer has attended Scuba Orientation Course (SOC) in Bangladesh Navy and Army Commando Course.

Enhancing Staff Decision-Making through Artificial Intelligence: A Case Study on Battlefield Threat Detection and Force Deployment Recommendation

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Abstract

The paper offers a complete machine learning-driven decision-support system, which is expected to assist military staff officers by carrying out three basic tasks: threat detection, threat classification and deployment recommendation. Data from 10,000 scenario combinations in battlefields were synthesized to handle the lack of publicly available operational data. The system contains a flow system with scenario-design, dataset-generation, preprocessing, train-test split, model-training, evaluation and a user-input component to analyze new scenarios in real-time. Multi-class threat classification was done through the assistance of a random forest classifier with the help of gradient boosting to detect binary threats. It has a clear and rule-based logic layer, which transformed the model outputs into deployable recommendations. The other nations that have been applying artificial intelligence in helping in the decision-making process in the military are also presented in the article. It explains why, as of today, Bangladesh Army is at the bottom of the pack in this regard and also provides a realistic, step-by-step roadmap to be taken. Military operations generate great amounts of informations. The staff officers should be in a position to process such information within a short duration of time to detect threats, assess risks and propose the deployment of the appropriate force. The traditional manual ways of analysis, though efficient, are time-consuming and a heavy burden on the staff, particularly during the time of rapid change of operations. The solution may be found in artificial intelligence and its subfield, machine learning.

Keywords*: Artificial Intelligence, Machine Learning; Threat Detection, Military Decision Support, Deployment Recommendation.*

Introduction

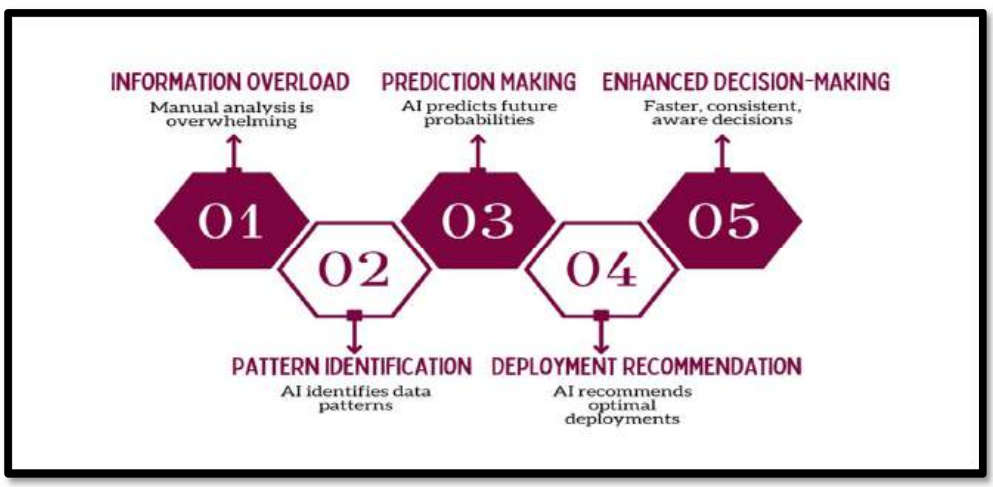
Twenty first century war has significantly changed in nature. The present battlefields are not only marked by the physical manoeuvre but also by information, promptness and benefit in the decision-making process. The commanders and the staff officers must deal with the information received in a variety of forms and in a variety of places simultaneously, with the harsh time constraint. The ability to make the right decisions promptly has therefore been one of the marks of successful operations.[1]

The traditional approach, in which the staff officers rely on manual analysis, map studies, written estimates and briefs in order to have an understanding of the situation and prescribe courses of action.[2] Military professionalism still centres on such practices, which are increasingly under pressure owing to the volume and rate of information.[3] The information flow is in terms of the intelligence reports, surveillance feeds, communication logs, weather data and operational updates that are constant, thus posing a threat of information overload. As a result, the staff officers may find themselves wasting their time on unnecessary data sorting and data analysis at the cost of less time to evaluate and make judgements and communicate with the commanders.[4]

Machine learning (ML) and artificial intelligence (AI) are one of the opportunities to help staff officers by mechanizing part of the analytical process. Identifying patterns in data, making predictions and estimating probabilities are aspects that can be useful to human decision-makers and tasks that are to be performed by machine learning systems.[5] It is important to mention that these systems are not aimed at replacing human judgment. The responsibility lies with the commander and staff in decision-making; AI is an assistant to increase the speed and consistency as well as situational awareness.[6]

Several modern armies already realised this potential and have begun to implement AI into the process of intelligence analysis, surveillance, logistics and command-and-control. On the other hand, Bangladesh Army does not have much experience with AI-based decision-support tools. The article in question addresses this gap by proposing a viable machine learning-based threat detection and deployment recommendation system and commenting on how these functions can be applied to Bangladesh Army in a responsible and controlled manner.[7]

Figure-1: Implementing AI in Military Decision-Making



Source: Author's self-construct

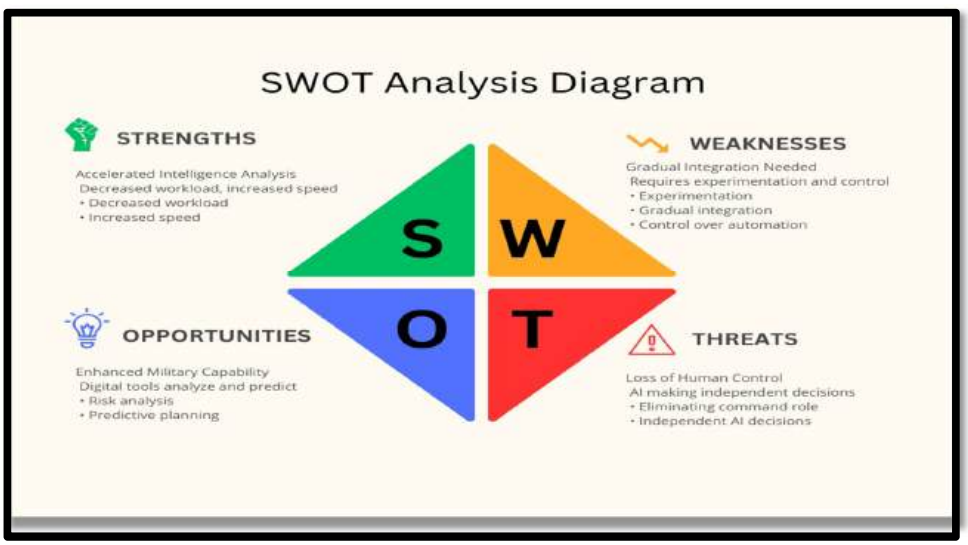
Use of Artificial Intelligence in Military Decision-Making: International Experience

United States-Intelligence and Planning Acceleration: Among the most obvious options of military AI use is the project of the United States Department of Defense, which is often known as Project Maven. The main aim of this programme was to apply machine learning to help intelligence analysts to work with masses of image and video data. Instead of having to replace the role of an analyst, the system automatically identified objects of interest so that humans can concentrate on the interpretation and decision-making processes.[8] The most important insight of the experience in the United States is that AI is valuable by decreasing the workload and increasing the speed of analysis. The intelligence collection does not confine staff officers and analysts; it is time that does. Having machines do the repetitive work like scanning data, identifying anomalies and so forth, means that human operators will be able to spend more time on judgement, coordination and planning.[9]

United Kingdom-AI-based Defence Institutionalisation: According to the Defence Artificial Intelligence Strategy of the United Kingdom, AI is one of the keys to future military capability. The strategy indicates a situation where the commanders will be assisted by the digital tools that will analyse and predict risks as well as plan. However, it is interesting to note that the United Kingdom pays attention to experimentation, gradual integration and control over the general large-scale automation.[10]

NATO-Responsible and Controlled Adoption: The North Atlantic Treaty Organisation (NATO) has admitted that AI will be involved in every side of military activity in the future. The method by NATO however, lays great emphasis on responsible usage, transparency and human control. The AI systems will be supposed to be explainable, auditable and comply with legal and ethical requirements.[11]

Figure-2: SWOT analysis for Implementing AI Decision Making

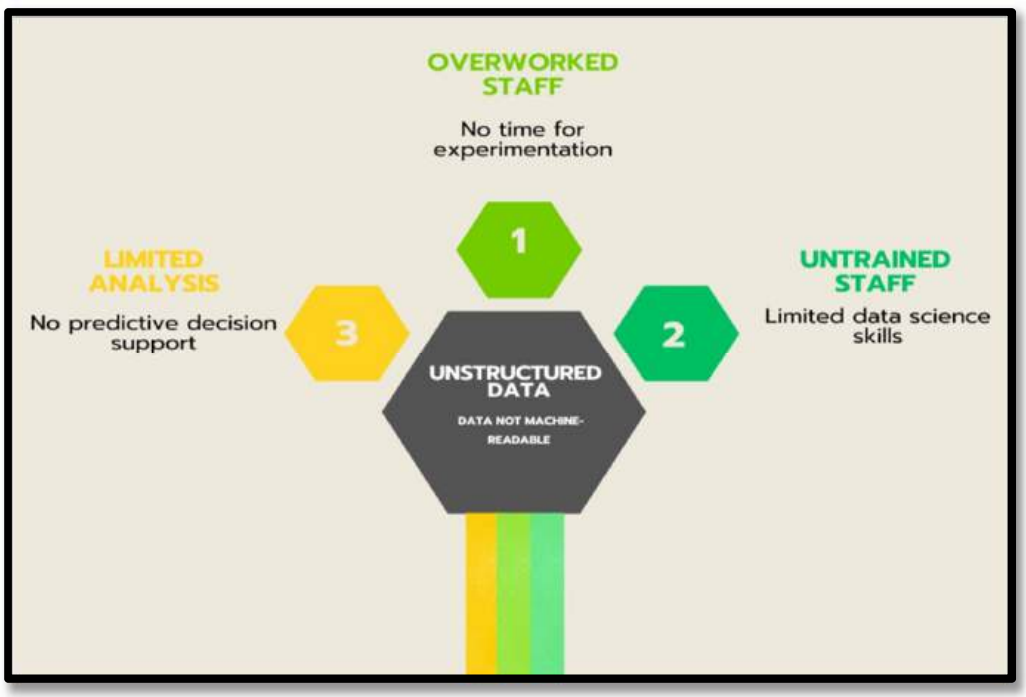


Source: Author's self-construct

Lessons for Bangladesh: It has been observed internationally that successful adoption of AI in the military should be based on: good perception of operation requirements, qualitative and organized information, fitting into the current processes, qualified staff that will be knowledgeable about military logistics and AI constraints. The lessons presented here make a direct impact in the design and the recommended adoption of the system outlined in this article.

Bangladesh Army Problems: Although Bangladesh Army is still undergoing modernisation, it has a number of problems with integrating AI-based decision support. To begin with, a great majority of operational and training data are not in structured, machine-readable form. Second, the current command and control systems are not aimed at predictive analysis or decision support but at communication. Third, the staff officers already have excessive workload and they do not have time to experiment with new tools. Lastly, trained staff in data science and machine learning is limited. These obstacles do not mean that it is incapable but just the necessity to approach the adoption of AI in a realistic and a staged approach.

Figure-3: Limitations of Bangladesh Army in Implementing AI Decision-Making Methodology



Source: Author's self-construct

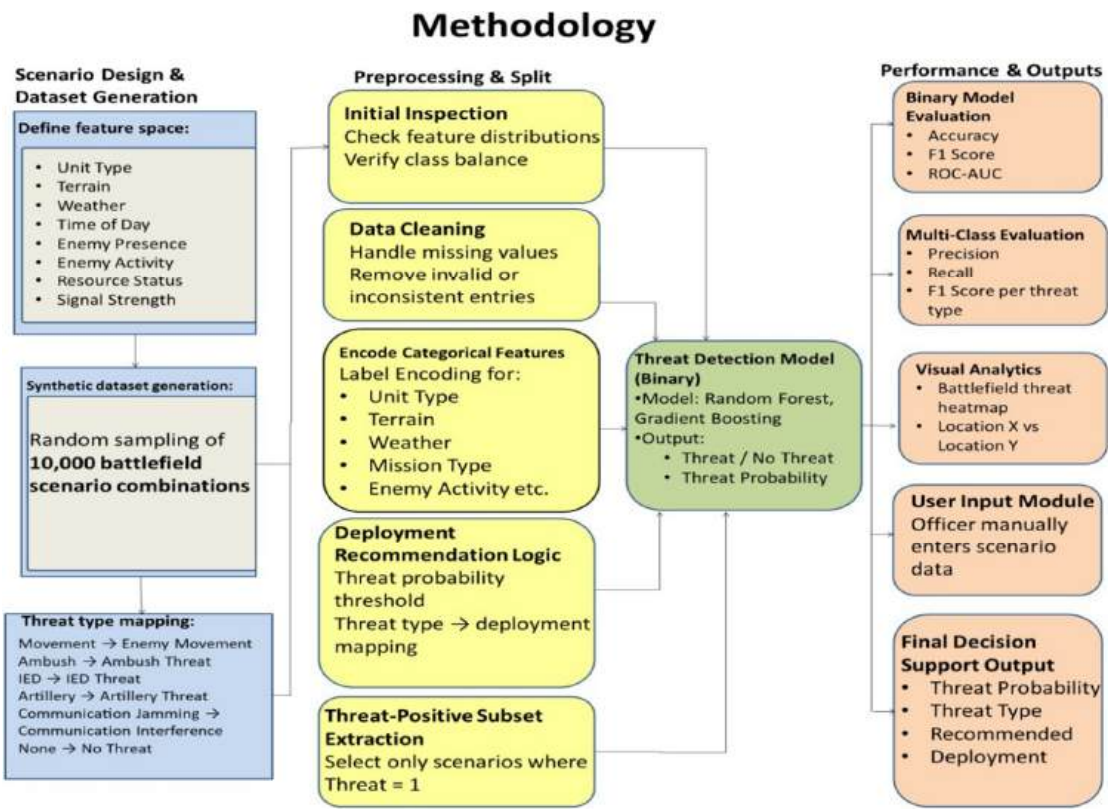
In this section, the methodology that will be followed in this research will be presented in a step-by-step manner. The rationale of an elaborate presentation of the methodology is to make sure that the process is transparent to the military individuals who might lack technological

expertise in the field of machine learning, but are well-versed in staff operations, battlefield planning and analysis. The methodology has been constructed to imitate the scenario in which staff officers examine circumstances throughout the military decision-making process and deploy machine learning as a means to quicken and assist that analysis. The methodology starts with a definition of a battlefield scenario, then goes to the data generation and model training process and culminates with a workable decision-support product that can be used by staff officers.

The Decision-Support System Conceptual Design

The purpose of the system development was set up earlier than the data preparation or the model development. The system has been designed as a decision support tool rather than an independent decision-maker. It supports the staff officers by quickly and consistently analysing information about the battlefield, but the final decision is to be made by the human commanders and staff. The system aims to answer three core issues about staff, namely: Is the current situation concerning matters threatening? What nature of threat is there in case there is a threat? What kind of deployment or response is granted according to the threat that has been detected? All the decisions regarding the methodology were made according to this conceptual design.

Figure-4: Overall Methodology Flowchart of the Proposed Decision-Support System



Source: Author's self-construct

Battlefield Information Requirement Identification: The second stage was the identification of the battlefield information to be provided in the threat assessment. The officers in the actual work of the staff will consider the terrain, the enemy movement, the time, the capability of the unit, the availability of the resources and the communication state etc. Therefore, the parameters that were selected to be utilized in the representation of each scenario are as follows:-

Table-1: Battlefield Scenario Parameters and Operational Significance

Parameter	Description	Operational Significance
Unit Type	Infantry, Armoured, Artillery, Reconnaissance, Support	Determines mobility, firepower and vulnerability
Location (X, Y)	Grid-based coordinates	Enables spatial analysis and threat visualization
Terrain	Urban, Jungle, Plain, Riverine, Hill	Affects movement, observation and Protection
Weather	Clear, Rainy, Fog, Storm	Influences visibility and communications
Time of Day	0–23 hours	Day/Night operational differences
Enemy Presence	Probability [0–1]	Reflects an intelligence assessment
Enemy Activity	Movement, Ambush, IED, Artillery, etc.	Indicates the type of threat
Resource Status	Low, Medium, High	Limits or enables response options
Signal Strength	Probability [0–1]	Indicates command and control reliability
Mission Type	Patrol, Escort, Reconnaissance, Defence	Context for threat interpretation

Source: Author's self-construct

Justification for Using Synthetic Data: Most of the available information on the battlefield is rarely used in research due to its sensitivity and security.[12] The data on training exercises can be biased or unstructured, even at the level of data. To overcome these restrictions, synthetic data generation is used in the study. The researcher can use synthetic data for the following purposes:-

- Simulated realistic operational patterns are apologized,
- Develop many safety situations,
- Check the end-to-end data analysis,
- Demonstrate the fitness in the merging of future real-data.

This is a common machine learning research approach to defence. It is appropriate in system development at the early stages.

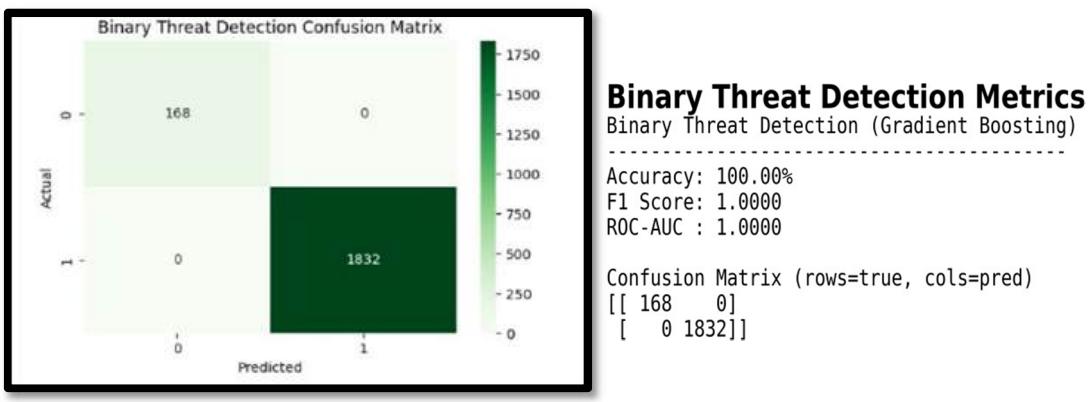
Designing of 10,000 Battlefield Scenarios: The parameter and range of values having been made, a man-made dataset of 10,000 battlefield scenarios was generated through random sampling. Individual situations are the product of a unit, terrain, weather, enemy activity and operations etc. A high number of scenarios ensure that there is sufficient diversity, whereby the machine learning models get the general trends and not specific cases. From a staff perspective, the dataset may be viewed as a set of hypothetical operational scenarios in thousands that can be acquired by the system, which can be learnt by the system.

Threat Presence (Binary Threat Labelling) Definition: The identification of a situation as a threat is the first step of the analysis in real work of the staff. To repeat this line of thinking, a binary threat was assigned to every scenario. A threat was stipulated as a contingency in case: presence of the enemy was to be determined to exceed some pre-determined amount or not; enemies movements of any kind were reported. Otherwise, it was defined as No Threat. Such rule-making labelling guarantees transparency and is also compatible with the general logic of the military. In Binary threat labelling –

0 = No Threat **, 1 =** Threat
Binary performance is measured using:

Accuracy: Acc = T P +T N/T P + T N + F P + F N
Precision: Prec = T P/T P + F P
Recall: Rec = T P/T P + F N
F1-score: F1 = 2 *(Prec·Rec/Prec+Rec)
ROC–AUC (threshold-independent separability)
Confusion matrix (counts of T P, T N, F P, F N)

Figure-5: Binary Threat Detection Model Confusion Matrix



Source: Author's self-construct

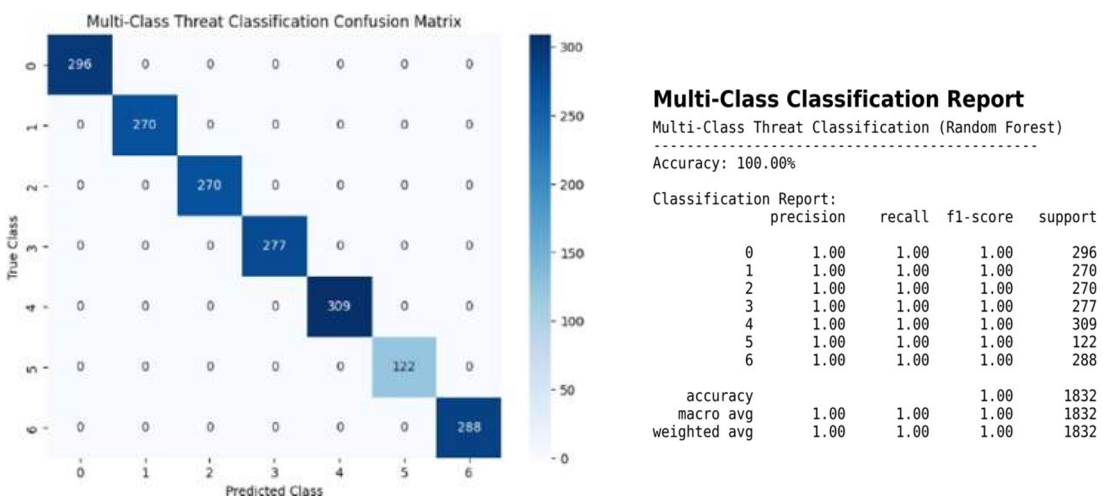
Threat Type (Multi-Class Labelling) Identification: Once the existence of a threat had been determined, the category of the threat was determined. All threats are not answered in a similar way and therefore, the classification of threats is necessary to answer them significantly.

Table-2: Threat Type Categories and Descriptions

Threat Type	Description
Enemy Movement	Suspicious or confirmed enemy manoeuvre
Ambush	Likely or planned ambush activity
IED Threat	Presence or likelihood of improvised explosive devices
Artillery Threat	Risk of indirect fire attack
Supply Line Compromise	Threat to logistics routes
Communication Interference	Jamming or disruption of communications
No Threat	No hostile activity detected

Source: Author's self-construct

Figure-6: Multi-class Threat Classification Detection Model Confusion Matrix



Source: Author's self-construct

Preprocessing and encoding Data: Machine learning models require numbers to be fed, but battlefields contain a great number of parameters, which are categorical. Preprocessing was therefore performed to convert all the inputs to a proper numerical format. This stage included: checking the dataset on non-conforming or absent values, grouping of nominal variables, terrain and unit type, separation of input characteristics and the names of the outputs. The same thing happens to the standardization of reports done by staff officers prior to an analysis.

Train-Test Split and Data Alignment: In order to measure the performance of the models realistically, the data were divided into training and testing groups at a ratio of 80:20. The training set was used to teach the models and the testing set was held to test them. Only the cases involving threats were selected in order to categorize the threats. Close correspondence of indices also ensured that features and labels were put in place.

The Threat Detection Model Training: The threat detection model was trained with the help of the gradient boosting algorithm. This model estimates the parameters of the fight fields dependency and creates a binary decision and a score of probability.

The Threat Classification Model Training: The random forest classifier was trained in such a way that it identified types of threats out of threat-positive cases. The model is suitable because it incorporates a variety of options to select and presents similar results of classification.[13]

Performance Evaluation of Model: Model performance was measured using accuracy, precision, recall and F1 score. Confusion matrixes and classification reports have been generated to determine the effectiveness of different types of threats.

Table-3: Performance Evaluation in Threat Detection vs Threat Classification

Metric	Binary Threat Detection	Multi-class Threat Type Classification
Task	Threat Label (0/1)	Threat Type (multi-class)
Model	Gradient Boosting	Random Forest
Test set	Full test set	Threat-only subset (Threat Label=1)
Support (n)	2000	1832
Accuracy (%)	100.00	100.00
F1-score	1.000	1.000 (weighted)
ROC–AUC	1.000	N/A
Confusio summary	TN=168, FP=0; FN=0, TP=1832	Perfect diagonal (0 errors)

Source: Author's self-construct

Deployment of Logic Recommendation: This is not sufficient to make predictions that apply to the staff. A rule-based deployment recommendation layer was therefore implemented, such that model outputs could, on the other hand, be converted to action advice.

Table-4: Mapping of Threat Types for Deployment Recommendations

Threat Type	Recommended Deployment
Ambush	Deploy Reconnaissance Unit
IED Threat	Send Unmanned Aerial Vehicle
Artillery Threat	Mobilise Armoured
Supply Line Compromised	Reinforce Infantry
Interference of Communication	Increase Surveillance
Enemy Movement Detected	Increase Surveillance
No Threat	No Action Required

Source: Author's self-construct

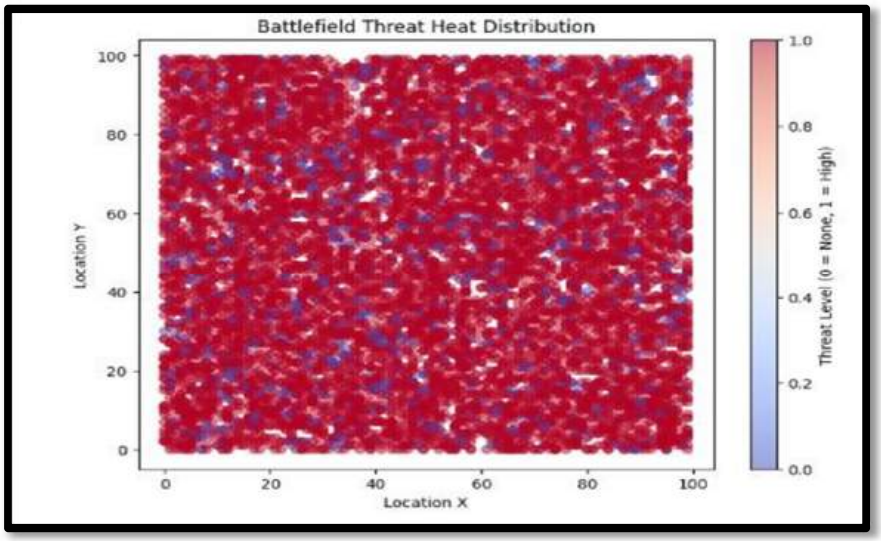
User Input Module and Real-Time Decision Support: One of the modules is the user input module, whereby the staff officers shall manually provide the battlefield information. This system feeds on the input and provides outputs on a real-time basis with trained model.

Figure-7: Sample User Input, Threat Detection and Recommended Deployment as per Logic

Source: Author's self-construct

Visualisation and Situational Awareness: The forecast of the threats was visualised as a heatmap of the territory of operation to enable easy situational awareness.[14]

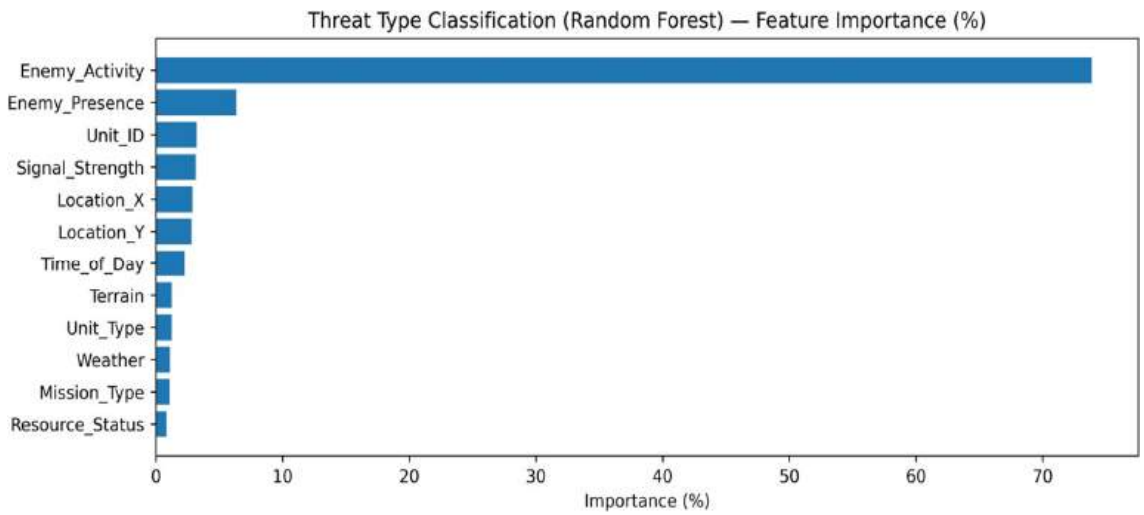
Figure-8: Battlefield Threat Heat Distribution



Source: Author's self-construct

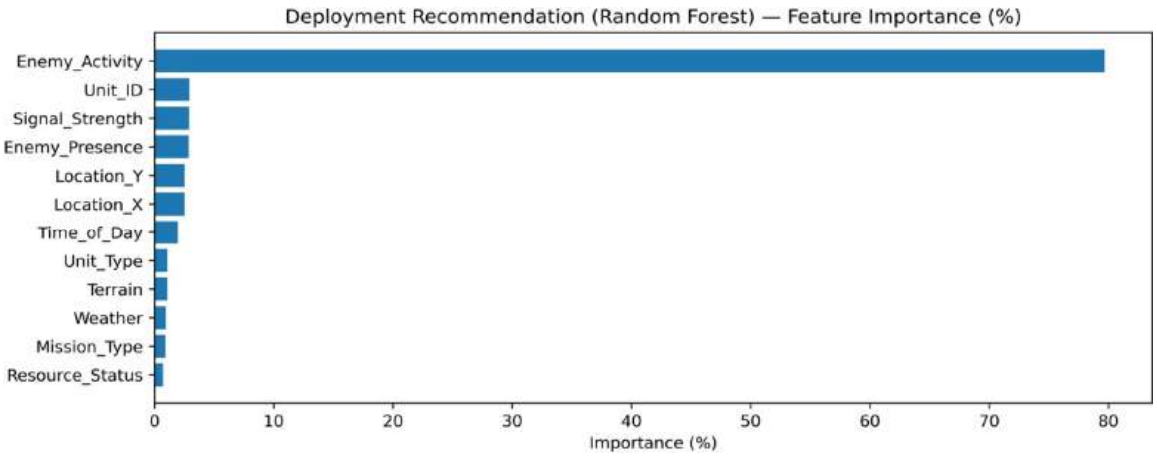
Feature Importance Percentage: The parameters or features which are set manually, affect the threat type and deployment recommendation like, weather contributes to decision making x%.[15]

Figure 9: Feature Importance in Determining Threat Type



Source: Author's self-construct

Figure 10: Feature Importance in Determining Deployment Recomendaion



Source: Author's self-construct

Result

The threat detection and force deployment recommendation model has shown 100 % test accuracy in binary threat detection using Gradient Boosting Model. Also 100% accuracy in threat type classification using Random Forest Model. Here, Threat Label and Threat Type were generated using deterministic rules based on Enemy Presence and Enemy Activity. Therefore, the ML models were effectively learning a rule-consistent labeling function. It explains why perfect performance is observed on the test set.

Table-5: Mapping of Threat Types for Deployment Recommendations

Component	Model/ Output	Key Result (Test Set)
Binary threat detection	Gradient Boosting → Threat Label (0/1) + probability (%)	Accuracy **100.00%**, F1 **1.000**, ROC–AUC **1.000**; Confusion: **TN=168, FP=0, FN=0, TP=1832**
Threat type classification	Random Forest → Threat Type (multi-class)	Accuracy **100.00%**, weighted F1 **1.000**; Multi-class confusion matrix: **0 misclassifications (perfect diagonal)**
Deployment recommendation	Rule-based decision layer → Action + reasons	Produces interpretable deployment action based on **P(threat)** + predicted **Threat Type**
Explainability (feature importance %)	Random Forest importances → feature contribution (%)	**Enemy Activity** (~**73.86%** for threat type; ~**79.68%** for deployment behavior)

Component	Model/ Output	Key Result (Test Set)
Manual scenario report	End-to-end pipeline → one-page PNG report	Generates a single report containing **scenario input** + **predictions** + **recommendation** + **reasons** (paper- ready)

Source: Author's self-construct

Methodological Summary

In a word, the methodology process is founded on the logical thoughts of the military through the assistance of machine learning. It begins with the meaning of realistic information on the battlefield, then goes to the systematic preparation and training of data and finally provides recommendations that can be interpreted and utilized by the staff.

Limitations of the Study

The proposed threat detection and deployment recommendation system that builds on the machine learning has a significant possibility of being a valuable decision-support resource but contains grave limitations, which must be mentioned to ensure the academic integrity and inform the future development.

Synthetic-data Dependence: Synthetic data is employed to train the system as a whole and it is not capable of being able to fully capture the complexity uncertainty, ambiguity, deception and conflicting intelligence of the actual battle-field. Thus, the results support the procedure, rather than the operational consistency in practice but the case study is an extremely convenient guide and initiating point.

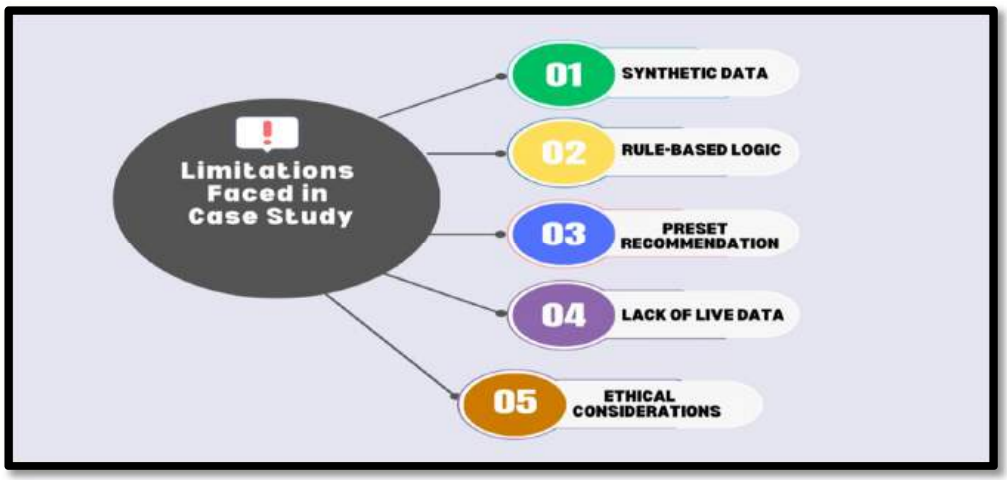
Rule Based Threat Labeling: Threat labeling and threat type assignment relies on a rule logic. Even though this process is unmistakable and easily comprehensible, it may not be the actual staff judgment, which may include such qualitative variables as intent of the commander, historical trends and intuition that cannot be easily measured in data sets.

Lack of Real Time Live Data: The system is run on snapshot images of a fixed situation and does not have any connection to operating inputs like surveillance, sensors or communication records. The situation at the battlefield evolves rapidly and therefore the next generation must consist of streaming data and must do dynamic predictions.

Preset Recommendation Mapping: In preset recommendations, deployment recommendations are constructed on preset mappings among threat categories and response options. It aids in clarity of doctrine and does not consider any practical constraints such as the state of the forces, the higher headquarters guidelines and the operational priorities.

Ethical, Legal and Accountability Failures: There is no explicit reference to the ethical, legal and accountability schemes in the system. Despite the fact that it is a human-controlling decision support, it requires stronger governance structures, responsibility chain and validation procedures before it can be operational.[16]

Figure-11: Limitations Faced in Case Study



Source: Author's self-construct

Discussion

The results of the present paper indicate that machine learning can be effectively implemented to help military officers with detecting threats and planning the deployment. The proposed system is similar to the logical thinking used when working with the staff. The most valuable thing about the system is decision support, where speed and accurate prediction is needed. The system allows staff officers to perform even more analysis, coordination and interaction with the commander as the scenarios are rapidly processed, vetted on possible threats and possible responses. This follows the experiences that have been witnessed in the international community where AI has been implemented to facilitate workload instead of abolishing human judgement. The system identifies the fact that, in the case of Bangladesh Army, even simple machine learning models designed and implemented properly can provide operational value which covers the problem of decision-making with human-in-the-loop. Machine learning outputs need to be interpreted and validated and also contextualised by trained officers.[17] In this technique, command responsibility is maintained and also takes advantage of a computational advantage.

Suggestions for Bangladesh Army

Following the results of the given research, a number of recommendations are offered to be used in the practice of introducing machine learning-based decision-support systems to Bangladesh Army gradually.

Prepare Datasets: Introduction of standardised reporting formats should be made to facilitate the storage and analysis of the data to be reused. The machine learning systems cannot operate without accurate data.

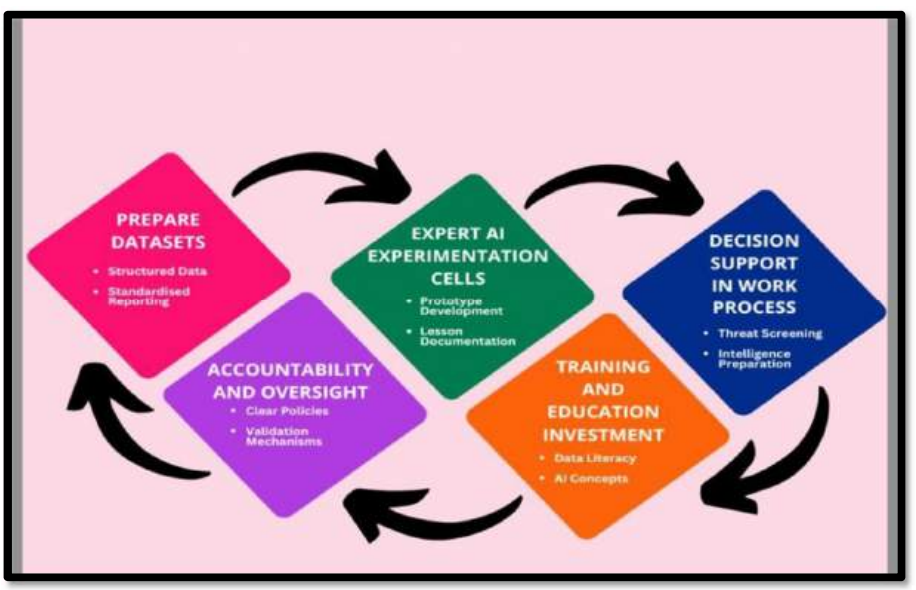
Development of Expert AI Experimentation Cells: Little, special- purpose experimentation teams are to be set up within the concerned directorates, like Signals, Intelligence and Operations. These teams are supposed to develop prototypes, test systems during exercises and write down lessons that have been learnt.

Implement Decision Support in the Current Work Process: Machine learning tools are to be presented as assistive tools in the process of planning and decision-making that exists. As an example, threat screening outputs can be utilized during intelligence preparation of the battlefield or course-of-action development without upsetting the established command structures.

Training and Education Investment: Data literacy, AI concepts and system constraints should be provided to officers and staff at a basic level. Academies like the Military Institute of Science and Technology are important in the preparation of this expertise.

Build Accountability and Oversight Mechanisms: There should also be clear policies when it comes to the usage of decision-support systems, who validates the output and accountability. This will assist in building trust and making sure it is used responsibly.[18]

Figure-12: Suggestions for Implementing AI in Bangladesh Army

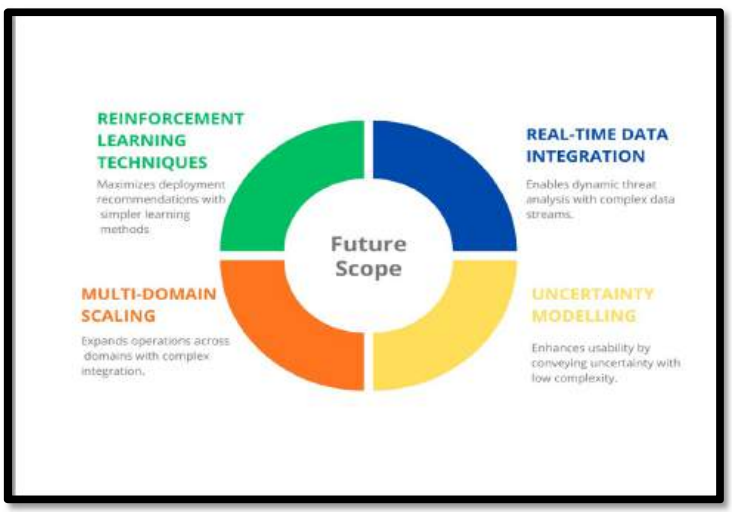


Source: Author's self-construct

Future Scope of the Research

The suggested system is the first step towards intelligent military decision support. A number of opportunities exist in terms of development. The innovation in future research can be the integration of real-time data to enable the system to process live surveillance feeds, sensor data and communication logs. This would allow dynamic threat analysis as opposed to working to analysis. Intermediate and more modern methods of learning like reinforcement learning techniques, might be considered to maximize the deployment recommendations according to the feedback and the results.[19] The system might also be scaled to multi-domain operations, e.g., air and maritime domains. Another area that can be worked on in the future is uncertainty modelling, where the level of uncertainty and confidence will be clearly conveyed to the staff officers. This would also increase usability and trust.

Figure 13: Future Planning Regarding this Case Study



Source: Author's self-construct

Conclusion

As this paper has established, machine-learning can have a significant use to support the military staff officers by improving the process of threat detection, threat classification and deployment recommendation. The proposed system is expected to transform the complex information of the battlefield into actionable information whilst retaining human judgement and command responsibility by using a transparent, structured and staff-oriented approach to information processing. Even though the system is currently made on synthetic data and simplistic assumptions, it offers a solid base to develop and apply in real-life scenarios in the future. In the case of Bangladesh Army, a gradual and responsive implementation of such decision-support tools is capable of enhancing situational awareness, decreasing the staff workload and increasing the

response time. Machine learning-enabled decision support is not only a technological improvement, but a required change towards contemporary and efficient military action in the era when information advantage has been turning into the determinant of operational success.

Notes and References

1. 'Modernizing Military Decision-Making: Integrating AI into Army Planning,' *Military Review* (Online Exclusive), U.S. Army University Press, 26 August 2025, available at https://www.armyupress.army.mil/Journals/Military-Review/Online Exclusive/2025-OLE/ Modernizing- Military-Decision-Making/ (accessed on 02 September 2025).

2. C. Anthony Pfaff and Christopher John Hickey, *Integrating Artificial Intelligence and Machine Learning Technologies into Common Operating Picture and Course of Action Development* (Integrated Research Project), U.S. Army War College Press/U.S. Department of Defense (media.defense.gov), 15 July 2025, available at https://media.defense.gov/ 2025/Jul/15/2003754354/-1/-1/0/20250715_PFAFF-HICKEY_AIANDML_ ONLINE.PDF (accessed on 02 September 2025).

3. *AI for Military Decision-Making: Harnessing the Advantages and Avoiding the Risks*, Center for Security and Emerging Technology (CSET), Georgetown University, April 2025, available at https://cset.georgetown.edu/publication/ai-for-military-decision-making/ (accessed on 02 September 2025).

4. *Machine Learning-Assisted Command and Control: Exploring the Near- Term Feasibility and Utility of Machine Learning-Assisted Operational Planning,* RAND Corporation, 15 July 2021, available at https://www.rand.org/pubs/research_rep(accessed on 02 September 2025).orts/RRA263-1.html

5. *Summary of the NATO Artificial Intelligence Strategy,* NATO (Official text), 22 October 2021, available at https://www.nato.int/en/about-us/official- texts-and-resources/official-texts/ 2021/10/22/summary-of-the-nato-artificial- intelligence-strategy (accessed on 02 January 2026).

6. *Expert Consultation Report: Artificial Intelligence and Related Technologies in Military Decision-Making on the Use of Force in Armed Conflicts: Current Developments and Potential Implications,* International Committee of the Red Cross (ICRC) & Geneva Academy of International Humanitarian Law and Human Rights, 13 May 2024, available at https://www.icrc.org/en/publication/expert-consultation-report-artificial-intelligence-and-related- technologies-military (accessed on 04 September 2025).

7. Lieutenant Colonel Nizam Uddin Ahmed, 'Integrating Machine Learning in Military Intelligence Process: Study of Futuristic Approaches Towards Human-Machine Collaboration,' *National Defence College E-Journal,* Vol. 02, No. 01, January 2022, pp. 59–[SOURCE NEEDED], available at https://ndcjournal.ndc.gov.bd/ndcj/index.php/ndcj/article/ download/ 315/286/ 1077 (accessed on 04 September 2025).

8. 'Project Maven (Algorithmic Warfare),' U.S. Government (war.gov), available at https://war.gov/project-maven/ (accessed on 02 January 2026).

9. 'Accelerating Decision-Making Through Human–Machine Teaming,' *Wild Blue Yonder,* Air University, June 2024, available at https://www.airuniversity.af.edu/Wild-Blue-Yonder/Articles/Article-Display/Article/3816647/accelerating-decision-making-through-human-machine-teaming/ (accessed on 05 September 2025).

10. *Defence Artificial Intelligence Strategy,* United Kingdom Ministry of Defence, 2022, availableat https://www.gov.uk/government/publications/defence-artificial-intelligence-strategy (accessed on September 2025).

11. *NATO Decision-Making in the Age of Big Data and Artificial Intelligence,* NATO Allied Command Transformation (ACT), 2021, available at https://www.act.nato.int/wp-content/uploads/2024/07/20210301_AC- 2020_Final-Report.pdf (accessed on September 2025).

12. Giacomo Persi Paoli, et al *Artificial Intelligence in the Military Domain and its Implications for International Peace and Security: An Evidence-Based Road Map for Future Policy Action,* United Nations Institute for Disarmament Research (UNIDIR), July 2025, available at https://unidir.org/wp-content/uploads/2025/07/UNIDIR_AI_military_domain_implications_international_peace_security.pdf (accessed on September 2025); Leo Breiman, *Random Forests*, Statistics Department, University of California, Berkeley: January 2001, available at https://www.stat.berkeley.edu/~breiman/randomforest2001.pdf (accessed on September 2025).

13. 'Terrain visualization information integration in agent-based military logistics simulation,' *Decision Analytics Journal* (Elsevier/ScienceDirect), 2021, available at https://www. sciencedirect. com/science/article/pii/S2452414X21000583 (accessed on 02 September 2025).

14. Myriam Dunn Cavelty and Sarah Wiedemar, *AI Decision Support Systems on the Battlefield, CSS Analyses in Security Policy* No. 366, Center for Security Studies (CSS), ETH Zürich: September 2025, available at https://ethz.ch/content/dam/ethz/special-interest/gess/cis/ center-for-securities-studies/pdfs/CSSAnalyse366-EN.pdf (accessed on 02 September 2025).

15. *Autonomous Weapon Systems and AI-enabled Decision Support Systems in Military Targeting: A Comparison and Recommended Policy Responses Stockholm International Peace Research Institute (SIPRI), June 2025, available at*https://www.sipri.org/publications/2025/other-publications/autonomous-weapon-systems-and-ai-enabled-decision-support-systems-military-targeting-comparison-and (accessed on 02 September 2025).

16. *Decisions, Decisions, Decisions: Computation and Artificial Intelligence in Military Decision-Making,* International Committee of the Red Cross (ICRC), 13 May 2024, available at https://www.icrc.org/en/publication/decisions-decisions-decisions-computation-and-artificial-intelligence-military-decision (accessed on 02 September 2025).

17. Sven Clement, *'NATO and Artificial Intelligence: Navigating the Challenges and Opportunities'* (Special Report, 058 STC 24 E), NATO Parliamentary Assembly, 24 November 2024, available at https://www.nato- pa.int/document/2024-nato-and-ai-report-clement-058-stc (accessed on 02 September 2025).

18. 'Multi-Agent Mission Planning with Reinforcement Learning,' *CEUR Workshop Proceedings,* Vol. 2819, 2021, available at https://ceur- ws.org/Vol-2819/session1paper1.pdf (accessed on 02 September 2025).

19. *Joint All-Domain Command and Control for Modern Warfare: An Analytic Framework for Identifying and Developing Artificial Intelligence Applications,* RAND Corporation, 2020, available at https://www.rand.org/pubs/research_reports/RR4408z1.html (accessed on 02 September 2025)

Brief Biography

Lieutenant Mohammed Maruf Karim, Signals was commissioned in the Corps of Signals with 85th Bangladesh Military Academy (BMA) Long Course on 4th December 2023. After commissioning, he is posted in 9 Signal Battalion. Currently, he is pursuing his BSc in Computer Science and Engineering from Military Institute of Science and Technology (MIST), Mirpur, Dhaka. He has worked on multiple AI-based projects and developed a strong portfolio of hardware-driven initiatives focused on integrating AI, automation and advanced technologies into military operational environments. He is currently conducting thesis research on AI-driven image detection, with a focus on distinguishing AI-generated content from real images using advanced computational and analytical techniques. Recognized with a nomination for Best Mobile App Showcase at MIST, he further demonstrated his research capabilities through a poster presentation at the Responsible AI Summit.

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      (3) Place of publication,

      (4) Year of publication,

      (5) Volume, issue, page number.

2. **Examples- Book Referencing**

Notes and References

1. P.K Hitti, *Islam A Way of Life*, London, Oxford University Press, 1970, p. 90.
2. Salar Khan et al, *Scientific Indications In the Holy Quran*, Dhaka, Islamic Foundation of Bangladesh, 1995, pp.33-35.
3. Abul Kalam, *Bangladesh in the New Millennium-A University of Dhaka Study*, Dhaka, Dhaka University Press, 2004, pp. ii+8.
4. Shaikh Maqsood Ali, *From East Bengal to Bangladesh: Dynamics and Perspectives*, Dhaka, University Press Ltd, Second Edition, 2017, p.110.
5. Md Mahfuzur Rahman, *A Study on Drug Proliferation in Bangladesh*, Dhaka, Procholon Prokashan, 2017, p. 255.
6. Forces Goal 2030 is a military modernization program for Bangladesh Armed Forces which began in 2009 and was revised in 2017. Its main purpose is expanding the force size, acquiring modern war weapons and equipment and providing advanced level training. The Goal also stresses on developing indigenous defence industries and enhancing the capabilities of three services.

Journal/Magazine/Periodical Referencing

1. Fazilatun Nesa, 'Modern Education in the Life of Women,' *Sikha*, Vol 2, 1928, pp.223-266
2. A. O. Aldridge, 'The Sources of Franklin's The Ephemera,'*New England Quarterly*, Vol 27, 1954, p. 388.
3. Martin Indyk, 'The Strange Resurrection of the Two-State Solution,' *Foreign Affairs*, Volume 103, Number 2, March-April, 2024, pp. 8-31.
4. Farzana Fatima, 'Bangladesh and BRICS: Emerging Dynamics,' *biiss journal*, April 2024, pp. 259-278.

Visiting Website Referencing

1. 'Turkey,' *CIA World Fact Book*, available at://www.cia.gov/library/publications/the-world-facebook/goes/ tu.html.accessed on…… (date).
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