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MULTI-DOMAIN OPERATING ENVIRONMENT

Land Domain Readiness and Challenges

&

Human Resource Readiness and Challenges

SOROTAN DARAT
JURNAL TENTERA DARAT MALAYSIA
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DITERBITKAN OLEH
JAWATANKUASA DOKTRIN TENTERA DARAT

KETERANGAN

Sorotan Darat ialah Jurnal Tentera Darat (TD) yang diterbitkan sejak 1 Mac 1983 bagi mempertingkatkan budaya ilmu di kalangan warga TD. Jangka masa pengeluaran ialah setiap 6 bulan iaitu pada bulan Jun dan Disember. Segala isi kandungannya termasuk sebarang ilustrasi, gambar, jadual dan rajah tidak dibenarkan dicetak semula dalam apa corak sekalipun tanpa mendapat kebenaran Kementerian Pertahanan melalui MK PLDTD terlebih dahulu.

Sebagai sebuah jurnal eksklusif TD, Sorotan Darat berperanan sebagai sebuah platform perbincangan berkenaan isu-isu kontemporari yang boleh menimbulkan minat profesional ketenteraan. Bermula tahun 2020, penerbitan bagi setiap siri Sorotan Darat adalah berdasarkan kepada tema-tema penulisan yang tertentu hasil cadangan dan persetujuan daripada MK TD – Cwg OPLAT serta MK TD – Cwg P&P.

Isu-isu kontroversi biasanya menjadi nadi penggerak bagi sesebuah jurnal profesional yang mana ia dapat menjadi asas pemikiran dan perbincangan yang sihat. Artikel-artikel seperti ini akan lebih diberikan keutamaan, manakala artikel-artikel mengenai operasi, idea-idea latihan atau kegunaan peralatan adalah antara topik-topik yang sangat dialu-alukan untuk diterbitkan.

Semua pertanyaan mengenai Sorotan Darat hendaklah dikemukakan kepada Ketua Editor iaitu Kol Doktrin, MK PLDTD.

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FOREWORD

السلام عليكم ورحمة الله وبركاته

In the name of Allah, the Most Gracious and the Most Merciful. Praise to Allah SWT, because of His guidance and blessing, we are able to continue publishing *SOROTAN DARAT*, the Journal of the Malaysian Army. It has been the Higher Commanders' intent that this journal is able to contribute to the dissemination of military knowledge while enhancing the professionalism of the Army Officers.

As an exclusive Army Journal, *SOROTAN DARAT* aims to create a forum for discussion of matters that may arouse professional interest in any military issues. The featured articles covered a wide range of issues, in line with the theme sets for each series of publications. This edition of *SOROTAN DARAT* is featuring articles pertaining to **Multi-Domain Operating Environment (MDOE) – Land Domain and Human Resource Readiness and Challenges**. MDOE is crucial and dynamic in the current concept of operations, thus a thorough discussion and analysis on these two aspects will help in enhancing knowledge and perspectives of our Army Officers on the matters. Hopefully, the ideas and key information highlighted by all writers could enhance ideas and knowledge presented to the readers, as well as supporting the objective to develop Malaysian Army as a knowledge-based organization.

On behalf of the Editorial Board, I would like to convey my utmost gratitude to all writers for making the publication of this edition possible. We look forward to your continued interest in writing articles for this journal. I would also thank the Editorial Board for maintaining an effort to publish this Army Journal. Finally, let us pray to Allah Subhanahu Wataa'la for His blessings towards the great achievement and excellence of this organization. Thank you.

"*Latihan Teras Keyakinan*"

MEJ JEN DATUK MARZUKI BIN HJ MOKHTAR
GOC TRADOC

FROM CHIEF EDITOR'S DESK

السلام عليكم ورحمة الله وبركاته

In the name of Allah, the Most Gracious and the Most Merciful. Praise to Allah SWT, as the second journal of the year 2023, Edition 83 is successfully published to acknowledge the writers' effort in enhancing the readers' mind with informative, useful and meaningful articles.

The Editorial Council would like to express our appreciation to all writers who have contributed to the publication of this journal. The commitments and enthusiasm by the thriving writers are certainly a precious aptitude in producing a well-published journal. The golden wisdom in thinking and actions come in many forms as they can be extracted from various sources. Therefore, *SOROTAN DARAT* provides such a platform for the readers to extract the ideas shared by the writers in enhancing their professional knowledge and situational awareness.

SOROTAN DARAT Edition 83 enlighten the readers on the **Multi-Domain Operating Environment (MDOE) – Land Domain and Human Resource Readiness and Challenges**. Empowering the land domain and human resource capabilities in MDOE require a comprehensive approach that encompasses joint training, technological advancements, interagency collaboration, as well as modernized logistics practices. With the implementation of the right and comprehensive measures, land forces can enhance the readiness and operational effectiveness, enabling them to succeed in Multi-Domain Operations, thus effectively contribute to overall mission success.

The Editorial Council welcomes and encourages more new aspiring writers to contribute articles for future publications. Constructive opinions, dynamics comments and potential ideas as well as feedbacks from the readers are highly encouraged to improve the quality of the journal published in the future. Thank you.

"Knowledge is the Core of Confidence"

KOL NORULHISYAM BIN MD SHUIB
Chief Editor

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Brig Jen Hj Mohd Athiyah bin Hj Hasan was commissioned to the Royal Malay Regiment on 4th August 1990. He had been selected to attend the Science Logistics Management Diploma under UKM in Mei 1997 and had been transferred to the Royal Ordnance Corps since then. Brig Jen Hj Mohd Athiyah attended the Singapore Command & Staff Course in 2006, Malaysian Armed Forces Defence College and holds a Master's Degree in Social Science (UKM) in 2016. Throughout his service, he has held notable appointments and currently he is the Chief Director of Administration & Logistic in Army Field Command East Headquarters.

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MULTI-DOMAIN OPERATING ENVIRONMENT – HUMAN RESOURCES READINESS AND CHALLENGES

By BRIG JEN HJ MOHD ATHIYAH BIN HJ HASAN
ROYAL ORDNANCE CORPS

INTRODUCTION

The orchestration of military operations across all contexts and domains, coordinated with non-military operations, is how NATO defines Multi-Domain Operations (MDO) in order to support the Alliance. As usual, NATO has the challenge of defining MDO in a way that is agreeable, pertinent, and understood by all members. MDO now indicate different things to different states. To do this, NATO must successfully negotiate a deal with 30 countries, each of which has a different strategy and set of capabilities across the now-existing five operational domains of air, land, marine, cyberspace, and space.

According to the US Army, Multi-Domain Operations (MDO) are a broad range of coordinated activities that cover not just combined arms manoeuvres but also various information, cyber, and space operations. Additionally, the US Army's policy places a strong focus on influence on friendly, neutral, and hostile parties as well as conflict avoidance. MDO explores how the US Army can combat and defeat an adversary capable of competing with the US in all domains (air, land, sea, space, and cyberspace) in both competition and armed conflict.

MDO gives commanders a wide range of options for planning concurrent and succeeding missions while using surprise, rapid and persistent integration of capabilities across all domains, and presenting an enemy with a variety of conundrums in order to gain physical and psychological advantages, influence over the operational environment, and control. Multi-Domain Operations are the combined arms use of US Army and joint force assets to create and exploit relative advantages that help achieve objectives, eliminate adversarial forces, and consolidate gains for joint force commanders. Using US Army and joint capabilities, operations are completed at the lowest feasible cost by utilising all fighting units from each domain that are currently available.

The US Army's dedication to collaborative campaigns throughout the competitive spectrum is embodied in multi-domain operations. While securing allies and partners, US Army forces

participating in multi-domain operations gain an edge and demonstrate war readiness below the level of armed conflict. In order to achieve long-term political objectives, US Army forces close with and defeat the opponent, dislodge hostile formations, capture vital terrain, and rule over populations and resources.

HUMAN RESOURCE DEVELOPMENT STRATEGY IN ARMY FOR NEXT GENERATION (ARMY 4NEXTG) AND ARMY CHIEF DIRECTIVE 2023-2026

The key component for the Malaysian Army, or *Tentera Darat* (TD), to function successfully and efficiently is human resources. In order to attain the desired operational readiness level, the Army for Next Generation (Army 4nextG) plan must be backed by a completely managed human resource development strategy. The practises, rules, and procedures that influence employees' behaviour, attitudes, and resource performance are often referred to as development of human capital or human resource management. A military organisation needs competent, capable, and fighting-strengthening human resources to function effectively.

In order to respond in a Multi-Domain Operating Environment (MDOE), TD need to have a solid strategic development. Therefore, development of human capital as in selection and recruiting (recruitment), human resource development (development), planning (planning), and human resource retention (retention) are all necessary components of this strategy. It uses a holistic approach, considering cognitive, psychomotor, and spiritual factors. Future TD training strategies in the Army 4nextG must be competency-based in order to do a task or a few tasks (multitasking) either individually or collectively. Training concepts will incorporate the development of human resources via military education, and training will create a highly skilled, professional military individual and intellect without disregarding the fundamental requirements of cognitive, psychomotor, and spiritual requirements. The main objective of this strategy is to produce members who can generate TD as a learning organisation (learning organisation) and knowledgeable (knowledge army) and who can think critically and innovatively (thinking soldiers).

The development of human capital must focus on element of man and need emphasize of five elements of quotients such as intellectual quotient, emotional quotient, psychical quotient, social quotient and spiritual quotient. These five quotients must be developing hand in hand in order to get a complete personal in any organisation particularly to the TD.

The recruiting component in the selection of membership during the entrance of officers and recruits is extremely significant to give human resources that can satisfy the requirements to face the difficulties of this MDOE. throughout the first selection of officers and recruits throughout the recruiting process for TD, selection according to competence needs to be the focus. The competence required to meet the difficulties of current technology and the readiness of TD assets that will enter service may be seen in the choice of these officials and members. Taking the Cyberspace Environments problem as an example, selecting officers with information technology backgrounds who can assist in researching the most recent technologies. In Army Chief Directive 2023-2026, four objectives stated in management of human resources as per below:

❖ **Objective 1**. Intensifying The Human Resource Recruitment Process. The fundamental idea behind human resource management is recruitment. The idea of recruiting contains the following two crucial components:

- TD is dedicated to encouraging young people to choose a military profession as a vocation. The competition's goal is to draw in fresh talent and young people using a variety of venues, including the use of media.

- TD places a strong emphasis on the provision of human resources with specialised knowledge, particularly in the fields of management, science, and technology. TDs must constantly be ready to cope with the environment's strategic alterations, which frequently keep up with the current's quick technological advancement. Different men and women can find possibilities anywhere on the periphery.

❖ **Objective 2**. Strengthening Human Resource Development. Human Resource Development is defined as an effort to train and guide human resources in an organization. The core implementation of Human Resource Development is as follows:

- Provide competent coaches through coaching courses to enhance the credibility and criteria of a TD coach in the birth of a brilliant and knowledgeable TD citizens.

- Strengthening the military culture based on the *Sistem Pemerintahan Rejimental* (SPR) to form personal values and military profile individuals and organizations that are prestigious and quality.

- Strengthening of spiritual and religious aspects for strengthening personality and identity are based on spiritual, emotional, and psychological strengthening.

- Intellectual improvement of human resources in line with the needs level of professionalism of human capital through strengthening education Professional Military Education together academic improvement and training are parallel to Career Development.

- Increase the effectiveness of the level and capacity of the assignment through effective governance channels and transparent annual performance appraisals.

- Career path planning must be managed efficiently so that each TD citizen is in line with the age of service, career course and talents/skills acquired for the purpose of empowerment management skills.

- Application of knowledge management system or Army Knowledge Management to produce knowledgeable members at once improve the efficiency of the TD organization.

❖ **Objective 3**. Empowering Human Resource Planning. Planning human resources is a systematic process and can be achieved based on the following guidelines:

- The Service Scheme will be streamlined in line with the need's dynamic ecosystem within the TD organization to continue to be relevant to current development.

- Career Management of TD staff is carried out efficiently, transparently, and systematic. Career planning of each officer and member is based on individual performance and competence.

- The concept of appropriate and appropriate placement of personnel become the focus for the placement of labour in the organization. The role of human resources in critical care is based on a specific skill level or Subject of the Master Expert for allow assignments to be carried out effectively and efficiently.

- Systematic and continuous discipline enhancement program capable maintain a source of energy with integrity, dynamic and competent return on Investment (ROI) to the organization.

❖ **Objective 4**. Preserving Human Resources. Retention existing human resources is an important strategy to ensure investment in Human Resource Development previously planned provide returns to TD organizations as follows:

- Recognition to TD citizens who exhibit excellence to appreciate and motivate TD citizens.

- Management of welfare aspects implemented holistically and consistently meet the needs of personnel, families, and organizations.

- Providing more dynamic incentives to appreciate professionalism and experience, even in recognition of the complexity of the task military personnel.

- Strengthening the morale and motivation of TD citizens through the consolidation of *Jati Diri* based on balanced and integrated character building.

Following the selection of officers and recruits, a more complete research or study of the aspect of human resource development, notably in the Training System, which is highlighted in Army 4nextG, is required given that we are getting closer to this challenging MDOE. It is necessary to consider the availability of Training and Technology components that are comparable to current TD assets as well as those that will go into service. To succeed in the MDOE challenge, one needs study is the Training Centre's syllabuses for TD Officers and other levels. For instance, the US Army Futures Command and The Training and Doctrine Command, respectively, are vital to the development of the Multi-Domain Operations concept and the formulation of warfighting doctrine.

In order to determine operational readiness, the US Army compares the units that are ready to deploy to combatant commands' operational requests (force requirement), which are prioritised by national strategic direction. The initial exposure is provided via career training meant to improve knowledge of officers and other ranks. Officers and other ranks must now be chosen and trained in accordance with the present demands of TD. They must also have a certain set of skills. Moreover, a thorough strategy to enhancing the operational and strategic readiness of the US Army by recalibrating tactical readiness gains. Holistic Army preparedness is the ability of the US Army to create highly skilled, disciplined, and physically fit tactical units, maintain the ability and competence to meet the operational needs of the joint force, and accomplish the strategic mission of quickly deploying Army troops to combatant commanders.

We must consider training concerns affecting the Navy and Air Forces in order to address the MDOE challenge. For instance, the US Army declared that its leaders must assess their Army's ability to meet operational demands throughout a range of time periods, both present and future. This is due to TD's inability to resolve the MDOE problem on its own. Over time, joint training between the RMN and the RMAF should be improved and streamlined. The experience these trustworthy TD commanders have gained at the Armed Forces Staff College and Armed Forces Defend College serves as the best groundwork for their preparation for this MDOE scenario. For these suitable conditions to enhance skills and produce skilled TD Officers and other ranks, it is imperative that the upgrade of training facilities be given priority.

CHALLENGES IN HUMAN RESOURCES READINESS

During the period of human resource planning that is stressed in the Army 4nextG, the service scheme must be streamlined in accordance with the problems in this MDOE. TD officers and staff will get intensive abroad training through bilateral/multilateral agreements with Defence Cooperation partners like the US Army, UK Army, Australian Army and others in order to expand their knowledge and expertise. In addition, this bilateral agreement, through this defence cooperation, gives officers and other levels pertinent training to hone their skills. In addition, the TD service should give Officers and members greater chances to advance their education in fields of expertise related to MDOE issues. The deployment of these officers and members must be planned according to their areas of specialty.

Their knowledge and experience must be considered in order to be imparted to other TD officers and other ranks to help them develop their skills. According to their expertise, appropriate incentives or rewards should be given to encourage officers and other ranks to remain in the service so that their knowledge can be passed down to the following generation, especially officers and other ranks who have just entered the service. In addition to rewards or incentives, pay or special allowances can be provided and reviewed in order to be increased in accordance with expertise and suitability for these Officers and other ranks to stay in service. This is done to retain officers and other ranks who are experts.

In intensifying the recruitment process, TD focuses on promoting military careers according to field suitability as TD targets 60% to be prioritized in the fields of Science, Technology and Engineering, 30% in the field of management and 10% in areas of specialization where there is a scenario where the distribution of Graduate Officer Recruitment is not in line with the majors, they have during distribution into a corps itself. Studies should be conducted for recruitment at the graduate officer level or from National Defence University of Malaysia (NDUM) for coordination at the level of each relevant corps so that certain areas of specialization in the corps that require specialized officers can help the continuity of the related corps.

The 3rd objective in empowering human resource planning focuses on the notion and appropriate placement of personnel staff as its core theme. This is substantially impacted if officers and staff for each corps that need specialised training cannot be hired during the session. In a roundabout way, after they were in the army, these officers and soldiers were unable to employ their knowledge in the corps. The entry selection factors for each corps should be further refined so that specialized officers and personnel enter the corps that use their skills to the fullest. Meanwhile, Subject Matter Experts (SMEs) should be given more serious consideration when putting officers and members so that their morale is higher and they can do their tasks more effectively when their knowledge can be employed in the best location for them. They may indirectly adhere with objective 4 in the retention of human resources due to their high moral standards.

The problem of Body Mass Index (BMI) surpassing the standard of 26.9 set by the Malaysian Armed Forces (MAF) service involving officers and members of the TD has become a severe problem in recent years. In order to achieved the 4th objective, retaining human resources, this problem has become a taboo among

officers and staff since it makes it impossible for them to be promoted and the likelihood of continuing their service becomes tough. There is no question that these officers and members are excellent at their jobs, but this does not ensure their continued service. In addition to training, individual discipline in dietary intake was the most important element in the officers and members of the TDs engaged in keeping a BMI below 26.9. Research should be conducted to evaluate if a BMI of 26.9 is appropriate for all age groups, considering an individual's body mass factor.

Challenges faced by female officers and other ranks in the TD also among the topics been discuss. From the male perspective, most of them still have sceptical perception about the female performance. The Congressional Law enacted in 1948 bars women from direct combat and by extension from all jobs viewed as hazardously close to combat, where the risk of capture is high but in 2016 implementation plans for putting women in direct ground combat positions into action have been authorised (Kamarck, 2016). The Pentagon acknowledge that combat experience is not only a push toward promotion but in the top ranks a pre-requisite. If there is combat exclusion, there will be career limitation for women, "says David J. Armor, Ph.D., a sociologist and the Principal Deputy Assistant Secretary of Defense for Force Management and Personnel. People believe female officers should not be war fighters. The question is whether the female officers want to take this as a challenge or not. One of the issues that has not been well addressed is the requirement to control the mobility of female officers and staff during operations. Even when female officers share equally in the hardships of the field exercises, they are never comfortable with the lack of privacy in sleeping and showering arrangements. Although the 30% quota for women in TD has not yet been reached, the duty to participate in peacekeeping operations and act as observers can still be fulfilled. Due to limitations imposed by family and health considerations, it is extremely difficult to choose qualified female officials and members.

Lack of physical strength contributes to another problem with female officers in the military: they need greater medical attention. Female in all the services is hospitalized two or three times as often as men. When men and women are subjected to the same work requirements and living conditions, as during recruit and cadet training, female's hospitalization rates are significantly higher than men's rates for nearly all diagnoses: mental disorders, musculoskeletal afflictions, acute upper-respiratory and so on. In the service at large, differences in military occupation and off-duty behaviour mean different rates of hospitalization for the various

diagnoses. Servicewomen place a considerable additional burden on the already overburdened military medical system. Though many military women deny or downplay the effects of pre-menstrual syndrome (PMS) on the behaviour of women, medical experts estimate that 5% to 10% of all pre-menopausal women experience severe PMS related symptoms, including incapacitating depression, suicidal thoughts, and extreme mood swing and so on. Much of debate about the medical cost-effectiveness of women versus men has focused on rates of "non effectiveness" or "non availability" the amount of duty time service members miss while receiving medical attention. One problem with female officers in the military that does receive some attention is the problem of attrition, defined as the failure to complete an enlistment contract.

Attrition reduces service strength, increases personnel turbulence, and robs the service of its training investment. Women consistently attrite at higher rates than men. The difference is most dramatic between men and female high school graduates, the very people the services want most to keep. In 1981, nearly half of all Marine Corps female high school graduates failed to complete their enlistment contracts, more than double the rate for male high school graduates: 48% to 23.5%. ((Ret), 1983). In the Army, the attrition rate for female graduates was two-thirds higher than for male graduates: 40.3% to 24.8%. The largest reason for attrition among women is pregnancy? The services estimate that 25% to 30% of women who fail to complete enlistment contracts do so because of pregnancy. The Army found that one-third of the women who became pregnancy opted for voluntary discharges under the policy that leaves the decision to stay in or get out in the hands of the women. Pregnancy is perhaps the single greatest obstacle to the acceptance of women in the military among military men. (Simon, 2001)

In objective 4, there is a harmonious family institution and structured health management that can overcome problems involving female officers and members, as in a study conducted by the US Army. There is no doubt that the involvement of officers and women members in TD is very helpful and they will do their best to carry out their duties as military personnel and as wives and mothers in family institutions. This is not an easy task, especially for a woman who works as a soldier and needs a strong commitment in the military organization.

To maintain the sustainability of human resources, the fourth Objective in developing human capital is highly relevant. Because it affects how officers and other ranks behave in keeping with their level

of maturity throughout the service, balanced character development is crucial. Since there is so much strain in the military, having good mental health is essential for TD service members. One of the most demanding jobs in the world is the military world. It is guaranteed that these officers and other ranks will be able to stay in the service longer if they maintain a good attitude in the face of intense strain during their careers. Other ranks will strive to serve until the 21st year of service which allows them to retire while officers will continue their careers until they retire according to the age and rank of the latter.

When offering the greatest residential infrastructure to TD executives and members, the management of welfare concerns should be taken into consideration. Priority should be given to housing in cities with high subsistence costs to lighten the financial burden on TD members. For the convenience of the residents in the old quarters, maintenance is prioritised and occasionally must be restored.

Mental health needs to be taken into account in strengthening the psychological identity of a member. There is a demand for counselling services in TD because there has been an increase in mental health issues among TD members recently. The emotional stability of members may be indirectly threatened by external circumstances that may impair their mental health, such as signs of drug withdrawal, engagement in online gambling, and depression issues. A strong military organisation is personified by its members' mental and physical health.

One of the difficulties in preparing officers and other ranks with high skill levels to face MDOE issues is the budget planning issue. It is because it is quite expensive to prepare officials and other levels for training. Specialist training provided via defence cooperation should be exploited as much as possible because it is financed by the participating nations and has a limited quota. Large sums of money and resources are also required for the creation of training facilities for officers and TD members to meet the needs of the MDOE scenario. For instance, the installation of the MDOE simulator at the TD War Game Centre to teach TDs will very certainly need expensive materials and cutting-edge technology. Giving the Officers and other associated ranks specific allowances or incentives would need an additional budget and must be taken into consideration to improve the current system.

CONCLUSION

As conclusions, development of human capital is paramount or crucial. The organisation TD must have a holistic strategic approach in developing of human capital (man) in order to get a competence and knowledgeable personals or workers. The Chief of Army Directive and Army 4nextG concept must be execute well in order to achieve this objective. The army personals should have a positive attitude towards job or tasks. They must to avoid working in silos and TD must train and develop them to work as a team for unit or formation or cohesiveness.

Lastly, incorporating traits of human resource preparedness and the idea of training to handle more complex MDOE scenarios is a problem in terms of preparing future soldiers for the Army 4nextG. To provide professional human resources, competent and have a high fighting force to produce TD troops capable of acting in a variety of environments in the future. This is the ultimate goal of Human Resource Management in line with Army 4nextG. The challenges of Human Resource Management in facing MDOE in TD organizations are very complex because it is necessary to provide enough human resources, trained, intelligent and have the best physical, mental, and spiritual. Only the best officers and personnel can be retained in this military organization for the survival of TD. The provision of a high budget is also needed to support these human resource needs based on the objectives stated in the Army Chief Directive 2023-2026. The Malaysian Army is more equipped to work with us on our transformation projects and is more prepared to handle the major changes that will take place, although ongoing and new demands will present difficulties. The core of how the Army is and will remain the top land power to meet the operational needs of the combined force is its readiness at the tactical, operational, and strategic levels.

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https://www.japcc.org/warfare-areas/mdo/

MULTI-DOMAIN OPERATING ENVIRONMENT – LAND DOMAIN READINESS AND CHALLENGES

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INTRODUCTION

Technological advancements and modifications in the military's manoeuvre system provide the primary driving force behind changes in military tactics. When new technology enters the battlefield, plans, commands, tactics, techniques, and procedures must be updated along with the scheme of manoeuvre. This succinct history of warfare will address the key theories employed over time as well as the advancements in technology that led to modifications in our methods of combat.

The early conflicts were all one-sided. Armed with swords, spears, or muskets, the two armies would square up and fight until one army emerged victorious. Guerrilla warfare was a balancing approach that used tactics like ambushes, sabotage, and raids when one side was noticeably weaker or less equipped to fight in this conventional fashion. Subsequently, machine guns replaced the technology and sent the forces into the trenches.

According to Nicholas Murray, author of The Rocky Road to the Great War, "trench warfare proliferated when a revolution in firepower was not matched by similar advances in mobility, resulting in a gruelling form of warfare in which the defender held the advantage." Trench warfare became known as a symbol of war's futility. This type of warfare was often a stalemate that had high casualty rates. Then, there was a change in technology and doctrine. During World War I, the Germans focused on the scheme of manoeuvre by implementing infiltration tactics while the British and French focused on the development of tanks to achieve victory.

As we faced new threats such as Violent Extremist Organisations (VEO), doctrine shifted once more. From 2003 on, irregular warfare became the standard for fighting wars. Irregular warfare has been described as “a violent struggle among state and non-state actors for legitimacy and influence over the relevant populations.” The military around the world has been fighting this type of war for the last couple of decades in the responsible territories and regions. While the Malaysian Armed Forces (MAF) was dealing with

VEO threats, a new type of warfare emerged as the threats evolved. Because opponents will look and battle considerably differently from the VEOs we have fought in recent wars, there is a need to focus on MDO. We would be challenged in every sphere, and the pace of battle would only accelerate as new technology such as artificial intelligence and hypersonic reduced the period in which we could act and make decisions.

MULTI-DOMAIN OPERATIONS (MDO) CONCEPT

In 2018, the United States Army adopted the term "Multi-Domain Operations" (MDO) as a national doctrine. At the tactical and operational levels, the phrase was primarily utilized to maximize ground fighting strength. The U.S. Army's "Air-Land Battle" doctrine, developed in the 1980's in response to the Soviet Red Army's threat in the European theatre, is the foundation for the idea of multi domain operations. Either way, the U.S. Army's task remained to integrate itself into the coordinated combat across the conventional physical manoeuvring domains of air and land and use Command and Control (C2) of forces to defeat an enemy as large as the Soviet Red Army.

The concept of Multi-Domain Operations seems quite close to Joint Warfare doctrine. There are three fundamental distinctions between Joint Warfare doctrine and the Multi-Domain Operations concept that tactical planners should be aware of while working with other domains. The first of these is the idea of a near peer enemy, the second is the competition spectrum, and the third is the synchronization of effects at echelons above Brigade in order to establish areas of local advantage. What determines whether a country is a near peer is the country's capacity to compete across all domains.

A hostile country's hostile purpose alone is inadequate to make it a near peer; without significant capacity, the hostile country is a relatively benign threat. The Multi-Domain Operations approach takes into account a competition continuum that includes competition below armed conflict, armed conflict, and competition below armed conflict again. During the armed conflict phase, the Army will be required to penetrate enemy anti-access and area denial systems in order to enable strategic and operational manoeuvre, disintegrate enemy anti-access and area denial systems in order to enable operational and tactical manoeuvre, exploit the resulting freedom of manoeuvre to achieve operational and strategic objectives by defeating enemy forces in all domains, and re-compete by consolidating gains across all domains.

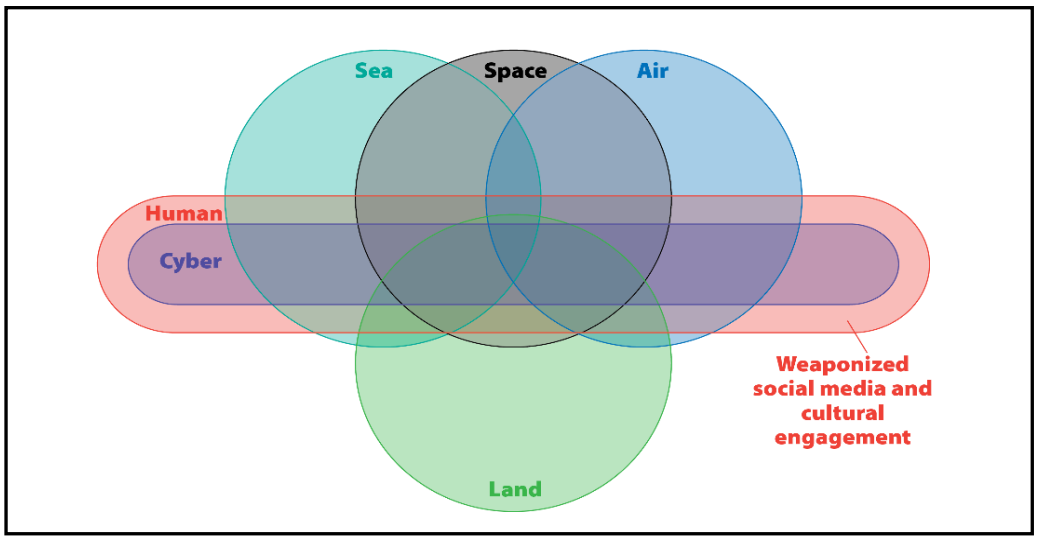

Figure 1: Multi-Domain Operations and Concepts

The origin of Multi-Domain Operations is evident. It recognizes that the way armies fight and win battles will alter as a result of the concept that disruptive technologies will change the character of warfare. It also indicates a desire to replicate the success of the Air-Land Battle, which is perhaps the most prominent example of conceptualizing an idea and then materializing capabilities throughout the doctrine, organization, training, material, leadership education, personnel, and facilities spectrum. Origin stories lay the groundwork for long-lasting concepts to arise. However, in order for ideas to have a long-term impact, they must change.

Two factors are pushing the need to evolve the notion of Multi-Domain Operations. First, ideas must change to ensure congruence with the enterprise's strategic objective. The National Defence Strategy outlines the military's tasks, emerging operational settings, technological breakthroughs, and anticipated enemy, threat, and adversary capabilities for the foreseeable future. It outlines how the unified force must evolve in order to compete, dissuade, and win in future armed confrontation. This strategy must be reflected in Multi-Domain Operation.

Second, Army Training and Doctrine Command, by building on the foundation and accelerating its application, as well as bringing together partners from across the joint force, drove development of the concept to an articulated idea and a picture of how the Army fits into it. The essential stakeholders are all present and committed to developing

and improving the concept as well as identifying viable solutions. The idea is set to take off.

MALAYSIAN ARMED FORCES (MAF) AND MULTI-DOMAIN OPERATING ENVIRONMENT (MDOE)

Malaysia faces new security and defence issues as geopolitics evolve, such as the growing relevance of maritime concerns, great power rivalry between China and the United States, and the advent of non-traditional threats. To tackle these difficulties, we will need to envision a future force. The change of government in May 2018 year has provided Malaysia with a rare opportunity to revisit some old assumptions and make new ones to move forward. One of the early major decisions of former Defence Minister Mohamad Sabu, which would have a long-term impact, was to commit to presenting a Defence White Paper to the new government to outline the future.

MAF is that one has to think of the long term, as decisions made today will have consequences well into the future, beyond the annual budget cycle and the five-year Malaysia Plan time frame. For instance, some not-very-useful weapon systems or ships bought at the whims of a politicians or decision maker, sometimes at the prodding of some defence traders trying to enrich themselves, may still be in use decades down the road even if they may not be the most suitable ones. Likewise, how the Armed Forces is currently structured has a lot to do with legacies that happened a while ago. Understanding history allows us to view things more clearly. Defending Malaysia entails defending three vital waterways: the Malacca Strait, the South China Sea, and the Sulu Sea, as well as two land masses: the peninsula and the Borneo regions of Sabah and Sarawak.

To be sure, due to counter-insurgency during the Cold War, the peninsula received the majority of attention, with a strong emphasis on jungle warfare. Historically, the Malays are a maritime people from the Nusantara, or Malay Archipelago, where people and things migrate freely.

The boundaries of modern independent Malaysia and Indonesia were established in 1824 by the British and Dutch. Within colonial masters' maritime borders, especially following the 1874 Pangkor Treaty, the fractured Malay nations mainly turned to agriculture and plantation for the consumption of colonial metropolitan areas. The battle against the Malayan Communist Party was mostly jungle guerrilla warfare, which formed the Malaysian Armed Forces in a

variety of ways, including army dominance and superiority in tropical jungle warfare.

Today, we face diverse demographics as well as unexpected geopolitical events. Assuming that the Armed Forces stay at their current size of roughly 123,000 during the next decade, designing the future force will have to take the following factors into account: To begin, we must recognize that Malaysia is a maritime nation, and the seas are our lifeline, with numerous resources derived from the seas and many vital water spaces to safeguard in an increasingly complicated security context. We will need clarity on how to manage our oceans and protect them from potential incidents and conflicts in the context of strategic competition between China and the United States, as well as other non-security dangers such as piracy and sea robbery. In short, more "maritime domain awareness" is required. Vietnam intends to be a "powerful maritime nation," with the explicit goal of expanding the maritime sector's contribution to the economy (oil and gas, tourism, and fishing) from 30% to 50%.

Malaysia will need a clear policy goal like the Vietnamese in order to get everyone on the same page that maritime is the future for both the economy and security/defence. (According to the Maritime Institute of Malaysia, the contribution of our maritime sector is estimated to be around 23% in 2022, but the number should have been greater if the potential of our oceans is fully realized).

With a clear strategic goal in mind, the Armed Forces and other security organizations, such as the Malaysian Maritime Enforcement Agency (MMEA), will need to adapt. Being a maritime nation, on the other hand, does not necessarily imply more and larger ships and a much larger fleet. Former Chief of Defence Force Tan Sri Zulkifli Zainal Abidin who said that a maritime nation may also mean “the army has to swim”, meaning we may need to consider establishing an amphibious marine force within the Armed Forces. To execute multi domain operations, the three services - Army, Navy, and Air Force - must be agile and collaborative. To be honest, the concept of collaboration is easier stated than done. Traditionally, each service raises, trains, and maintains its own troops. However, single-service operations will definitely not suit the needs of our day.

For an example the naval expedition in the “Indo-Pacific Endeavour 2019”, was commanded by an Air Force Commodore. HMAS Canberra was a tri-service which included the navy, army and air force personnel permanently. Surprisingly, the three-month trip included a civilian policy advisor from the Australian Defence

Department and another officer from the Foreign Department. The majority of the military medical professionals on board were reservists. Not only were the armed forces united, but the whole-of-government aspect was also obvious. In order to properly secure the Straits of Malacca, the South China Sea, and the Sulu Sea, we would need to be able to completely realize the two-theatre mirror operations between the peninsula and Sabah/Sarawak.

Second, we are now a very urbanized nation, with 76% of the population residing in urban areas. Insurgencies that used to happen in the jungles could very well happen in an urban setting. The siege of Marawi is a case in point. The question of resilience against any attacks must be taken into consideration in our urban planning while our defence planning must prepare for the possibility of urban warfare, taking into considerations non-traditional threats such as terrorism. Moving forward, we can't run away from the cyber domain, where the notion of "border" is even harder to define and the line between "cyber-attack" and "cyber war" is blurred. If we don't up improve our game, the domain will overpower us.

The Armed Forces are acutely aware of the maritime, jointness, mirror theatre, urban and other non-traditional threats, terrorism, and cyber defence concerns. It has also tried a variety of measures to address some of the difficulties to varying degrees. But what is needed now is a national understanding of these difficulties, as well as the political will to confront them head on. If we keep the present force size of 123,000, many current functions will need to be repurposed and upgraded to a more supplicated level.

Many of the current roles in the Armed Forces can be handled through the adoption of technologies such as artificial intelligence, drones, and other surveillance tools. Some of the non-combatant roles can be handled by non-military personnel. This would include revisiting the role of reservists so that we can tap into the potential of civilian expertise and experience. This is particularly true for the professional groups such as doctors, engineers, computer scientists and cyber security experts.

These are some of the numerous topics addressed in the Defence White Paper in the intention of providing guidance for the future. The Defence White Paper will not be able to provide specific answers to all of these long-term issues. What it seeks to accomplish is to provide pertinent questions for the next decade in order to provide guidance for following details to be worked out with more national

consensus for a strong Future Force to serve and fulfil the nation's new requirements and challenges.

DEFENCE INDUSTRIES AND REVOLUTION IN MILITARY AFFAIR (RMA)

Defence transformation, or the RMA, is used interchangeably. There are various interpretations of this term. It generally refers to the introduction and implementation of new thinking with regards to strategy and tactics, military organization and doctrines, force structure and overall weapons acquisition. The RMA is more than simply modernization efforts. It entails a quantum leap in military advancement, embodies development both in terms of 'hardware' in the form of technology, weapons and platforms, and 'software' in the form of organizational and doctrinal innovation. Consequently, the RMA is driven by various factors, such as changes in the global security environment following the end of the cold war, globalization and the rapid advancement in the information technology sector.

Newer concepts such as Command, Control, Communications, Computing, Intelligence, Surveillance and Reconnaissance (C4ISR) networks, network centric or network-enabled warfare, and the digitization of ground forces have simply become key components of the RMA. Malaysia has not formally adopted the RMA as an official doctrine, but it has nevertheless embarked on a course of substantial military modernization and impressive technological upgrading of its armed forces since the early 1990s.

The changing security landscape in the post-Cold War era, followed by the technological advancement in defence materiel, has created the need for Malaysia to purchase new equipment as well as upgrade and overhaul the old ones. The change from conventional threats to non-traditional security concerns, such as piracy, drug and human trafficking, border control, and illegal immigration, has necessitated platforms and weaponry capable of meeting these challenges. Purchases over the past decade has concentrated on items such as submarines, fighter aircraft, attack helicopters, modern battle tanks and various types of tactical missile systems integrated with advanced avionics and radar systems. In addition, these purchases have necessitated increased interoperability between the various types of equipment available, as well as between the air, naval, and ground forces of the Malaysian military.

This has caused a shift in emphasis by the MAF away from procurement of traditional platform-centric equipment toward information technology and network-based systems. The MAF, therefore, are already incorporating concepts such as C4ISR and net-centric operations into its force structure and operational thinking. The current process of Malaysia's military modernization development has had some effect on the local defence industry. Several local firms have acquired at some capability in such areas as C4ISR and networking, and Malaysia has even developed its own unmanned aerial reconnaissance vehicle. These firms are working closely with the MAF to further develop their capabilities in required areas in order to meet future requirements of the military. However, despite the efforts to promote local content and industrial participation, Malaysia remains highly dependent on imports of defence equipment, especially those that may contribute to any possible Malaysian RMA.

Overall, while Malaysia is a long way away from any kind of 'revolution in military affairs', its modernization plans have at least been moving in this direction. This suggests that the Malaysian defence industry has yet to reach its potential. Despite considerable investment and strong government infrastructural and monetary support, the local defence sector is still struggling to take-off. The industry's capability is still confined to basic manufacturing activities and Maintenance, Repair and Operations (MRO), and local defence manufacturing is still confined to a limited number of sectors, with minimal R&D activities or export opportunities.

Despite the requirement for local content and industrial participation, more than ninety percent of the equipment used by the MAF is still sourced offshore. Various reasons are given for its poor performance. At the national level, it is claimed that there is no concerted effort to ensure that policy relating to defence industry development is implemented effectively. This has led to accusations of a lack of transparency and consistency in the selection and awarding of contracts to deserving local industrial players. There have also been allegations as to the commitment and sincerity on the part of government when it comes to truly wanting to develop a strong defence industrial base. Further, offshore suppliers are often accused of not wanting to transfer and share technology towards developing the local defence industry.

The Original Equipment Manufacturers (OEM) are often said to lack the trust in departing, mainly their defence technologies for fear of competition. On the other hand, local companies are either recipients of the technology or workshares are also blamed for not possessing

the capabilities and capacities to undertake the necessary work. Finally, it is claimed that the MAF themselves are still wary of locally produced product and services. These issues, taken together, constitute a significant barrier to the development and growth of the Malaysian defence industry. In light of these concerns, and considering the economic and strategic significance of the defence industry, greater effort by the Government to foster a value-adding and competitive Malaysian defence industry does seem warranted. This seems likely to entail constant review of local defence industry performance, as well as the implementation of stronger government intervention in the policies, processes and implementation mechanisms.

LAND DOMAIN WAY FORWARD IN MULTI-DOMAIN OPERATING ENVIRONMENT

The Land Domain must fundamentally have re-conceptualize then how they contribute to the joint fight if they are to be an effective force. They must shift from being a demanding consumer to a true partner capable of enabling, acting for, and supporting the joint force. The multi-domain operations is a new idea for land forces in the joint fight. This notion promises to restore a commander's ability to maximize the tools available to them in all domains. With this notion in place, the land force will be able to establish windows of superiority not just in the land domain but also in other areas.

Multi-domain operations will allow the joint force commander to control the targeted domains by deploying a variety of land-based cross-domain firepower. As a result, multi-domain battle has the potential to neutralize opposing capabilities. Jointness remains the key to conquering these systems, but it must be approached differently. Today's collaborative operations will span significantly more areas than planners were previously dealt with. It is also a jointness in which no single military service has a monopoly, nor does any area have a set boundary.

Today, MAF freedom of movement is publicly assailed in all spheres. The "democratization" and rapid expansion of technology are boosting the lethality and reach of minor governments and non-state groups, many of which do not fight in accordance with the same legal and ethical precepts respected by regional nations.

This trend can be reversed with the use of land forces. They must be built, equipped, and taught to gain and retain a competitive advantage in all areas, as well as to understand and respond to the requirements of the future operating environment. The land force must

also alter its perception of its role in the unified force. Land forces have been high-demand consumers of joint force capabilities during the last 25 years, operating under an umbrella of air and marine superiority. If the joint force is to succeed, the ground force must now be capable of giving as well as receiving and supporting actions in other domains.

The multi-domain operations eliminate the usual environmental barriers that previously constrained who performs what where. According to this viewpoint, the theatre of operations is a unified whole. The most valuable capacity should be assigned the assignment, regardless of its technological origin. Newly emerging technology will allow the land force to function in ways that were previously restricted by its domain boundaries. These technologies will enable the land force to rule not only the land, but also to project power into and across other domains.

There has always been a grey area between the domains since the emergence of the concept of the joint war. Warships, for example, have been able to project power onto land, as has coastal artillery, which has been able to project power onto the sea. The technology of today and the near future will enlarge these grey zones to encompass vast distances and even entire theatres. As a result, the range of future land forces will be so vast that distance will no longer be relevant as a domain boundary.

Land forces must consequently consider themselves as a full partner capable of enabling, acting for, supporting, and even controlling operations in other domains, rather than just a recipient of aid from other services. This understanding serves as the foundation for the multi-domain conflict concept. Land forces can rethink how they fight and so make a more effective contribution to the combined war by leveraging modern technologies such as precision missiles, long-range strike, and enhanced sensors.

Multi domain operations will provide the joint force with new alternatives and possibilities while putting the adversary in a bind. Land forces can discourage, deny, and defeat the opponent by land-to-sea, land-to-air, land-to-land, land-to-space, and land-to-cyberspace fires and effects. The combined commander will be able to capture, hold, and utilize the initiative as a result of this. The ability to perceive, identify, and strike targets across the field of operations will also contribute to improved joint force security.

CONCLUSION

Commanders must be able to comprehend and shape the battle space in and across all domains. Because of their ability to investigate and comprehend the human backdrop of the theatre of operations, land force elements assist the joint commander in achieving the required degree of awareness. Modern opponents have demonstrated an ability to hide in places where they are difficult to detect, typically within a city and among a population. This is not a new element of warfare, but it has become increasingly prevalent in recent decades. However, the land force now has access to new battlefield sensing procedures and technology that can assist in locating foes while also affecting the views and allegiances of the local populace. The ground force has several modes of communication that provide significant redundancy. This means that information will continue to flow even if the enemy or the weather make them less effective. Such capable networks provide rapid and accurate decision-making, allowing the unified force to capitalize on possibilities.

Finally, the joint force commander should devise an effective campaign response to quickly changing obstacles that rely on access, often over large distances and domains under enemy control. To gain access, a joint force commander just needs to acquire brief domain dominance. This is accomplished through the synchronization of cross-domain firing and maneuvering to gain physical, temporal, positional, and psychological advantages. Obtaining momentary domain dominance enables land troops to defeat the opponent across all domains. To do this, the land forces can offer cross-domain fires and effects with increased range and precision in order to project power into the land, air, maritime, space, and cyberspace domains. Land troops provide layered sensors and responsive striking platforms that can change between areas quickly. This enables land troops to defend freedom of action and maneuvers across domains while denying the enemy the same.

Land forces project combat power in the land domain by deploying combined weapons maneuvers to close with and defeat enemy in close proximity to civilian populations while minimizing collateral damage. Combat teams of the required size and composition, capable of conducting cross-domain fires, will put the adversary in a bind. Land forces can operate safely over large areas, unfettered by weather or time on station, while still retaining the ability to concentrate as needed. The land force will give the joint force commander with greater ability to overcome any opponent advantage through the application of the evolving concept of multi domain battle. Land forces

can project force from the land domain to the other five domains. As a result, if the issue of the current and future nature of war is to be overcome, land forces must invest in and deliver future force capabilities that contribute to the struggle for domain domination across all domains.

The ability to adapt intellectually and culturally is critical for the successful conduct of multi-domain battles. Future combined force commanders must be able to see battle in many realms, not just one. This will also necessitate investment in, and ongoing evaluation of, the necessary equipment, education, training, organization, leadership, and facilities. Our possible foes have courageously taken a step forward in the evolution of war's character. The time for a response has passed.

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MULTI-DOMAIN OPERATING ENVIRONMENT – HUMAN RESOURCES READINESS AND CHALLENGES

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INTRODUCTION

According to Cambridge Dictionary, 'domain' means an area of interest or an area over which a person has control. It is defined as the area that we are looking forward to explore or we have already explored but to have a firmer grip on the area. The term of 'area' can either be literally described as a physical area that we can see, touch and feel or could be understood as philosophically or non-physical such as area of knowledge, information, responsibility and many others. However, in military world, if we talk about area, domain can be described land, maritime and air. The word domain is frequently used to described the capacity or capability of the relevant forces at their areas of responsibility.

The term Multi-Domain Operations (MDO) has gained in prominence over the past ten years as military forces formalise their strategy for combat outside the conventional limitations of land, sea, and air. (Donnelly & Farley, 2019). Similarly, Multi-Domain Operating Environment (MDOE) serves the interactions between two or more domains in relation to their interests. To properly utilise military capabilities, safeguard the force, and carry out any mission, one must have a thorough understanding of the operational environment of today. It goes beyond the actual limits of a specified location. The adversary, neutral, friendly, and other actors, facilities, weather, topography, Chemical Biological, Radiation, Nuclear and Explosive (CBRNE) risks and hazards, and the information environment are all parts of the operational environment. It also encompasses the sea, land, air, and space. The majority, if not all, of the elements that come together to form the operational environment have an impact on every domain and, consequently, every military element (Donnelly & Farley, 2019).

According to Cambridge Dictionary, 'environment' in this context refers to the conditions that we live or work in and the way that the factors influence how you feel or how effectively you can work. Environment is something that we cannot escape from as we live within the environment and either the environment affects us in many ways and put limitations on us or the environment changes or evolves to suit

our needs and requirements. The environment plays important role in our daily life and it is vital for us to quickly adopt ourselves so that we have the opportunity against the environment.

In this paper, we would like to discuss within the 3 main domains in Malaysian Armed Forces (MAF), the level of human or manpower readiness, how ready are the men to get their jobs done in the perfect or nearly perfect way and give excellent results across all main domains. The fundamental presumption that peoples are an organization's most valuable asset forms the basis of our understanding of the idea of human resources management. Therefore, one way to conceptualise human resources management is as implementing procedures and policies that guarantee the efficient use of human capital towards the achievement of organisational goals. The concept of "manpower readiness" refers to MAF's ability to satisfy the current and future human capital needs by having the appropriate personnel, skills, systems, and procedures in place. MAF's ability to adjust to changing conditions, overcome obstacles, and exploit opportunities in its operational environment depends heavily on the preparedness of its human resources. Human resource readiness is a critical factor in an organization's ability to adapt to changing circumstances, navigate challenges, and seize opportunities in its operating environment. Human resource is important in Malaysian Armed Forces since it is responsible in managing the soldiers. This paper also to discuss the challenges that wait for us in line with our effort for us to recruit, to train, to impart the knowledge, to improve manpower's skills, to retain their services and to ensure the men will enjoy their good lives within the service and after leaving the service for good.

HUMAN RESOURCE READINESS

Human resource management, or HRM, is the process of uniting individuals and groups to achieve mutual objectives (Rakesh et al., 2021). This segment of the management process pertains to the administration of human resources within an establishment. By gaining people's complete collaboration, it seeks to extract the best possible performance from them. It can be summed up as the skill of acquiring, training, and retaining qualified employees to effectively and efficiently accomplish organisational objectives.

The management of soldiers inside MAF to accomplish the MAF's goals and objectives is the responsibility of human resources managers. Because human resources are the factor that gives other factors of production life and dynamism, they are far more significant

than any other resource, including money, materials, technology, and processes. There is currently a lot of data to suggest that organisations with a strong human resources or people management focus tend to be more successful. The most valuable resource for any organisation is its people, a fact that has been well recognised in both literature and practical application. An organization's ability to effectively manage these dynamic human beings is critical to its success (Obi, 2015). The dynamic nature of MAF's human resource readiness necessitates constant observation, evaluation, and adjustment to changing internal and external circumstances. Human resources planning is the process by which MAF makes sure it has the right people in the right places at the right times to complete the tasks that will help the company reach its overall goals.

To effectively address issues and grasp opportunities in a setting that is changing quickly, human resource preparedness in MAF must be prioritised. Additionally, it aids in the recruitment, retention, and development of a competent team, which improves overall performance and competitiveness. The importance of human resource readiness was reiterated in the Malaysian Defence White Paper (DWP), where the management must be enhanced to ensure the ability to strengthen the MAF's preparedness continuously (Defence, 2020).

IMPORTANCE OF ELEMENTS OF HUMAN RESOURCE READINESS

These are the important elements of human resource readiness:

- **Identifying Candidate**. Putting in place efficient systems for recruiting and choosing cadets or soldiers will help MAF to find and recruit people who have the necessary abilities, credentials, and cultural fit. Only those, for both officers and other ranks (OR), who pass the minimum entry requirement will take the oath and serve our country. The candidates must physically and mentally fit to undergo tougher trainings ahead in order to ensure the 'products', who are the well-trained soldiers to be 100% ready to be deployed.

- **Development of Skill or Talent**. The implementation of training and development programmes to improve soldiers' abilities, knowledge, and skills, allowing them to execute their tasks successfully and advance within MAF. This is the reason why the suitable candidates must be identified in the early stage prior to the recruitment. The skills and talents will be developed

and enhanced to the highest point so that the soldiers can maximise their contribution to the country.

- **Preparing for Succession**. Finding and developing talent within MAF to create a pipeline of capable people prepared to fill important posts when called upon, such as during leadership transitions. It is also important to dismiss the 'indispensable symptom' which may create problems in MAF. A succession plan is essential to guarantee that all of our plans and visions will be carried out or improved upon by the future leader because leaders come and go. In this context, we are not only concentrating on the upper echelons of the hierarchy, but also on the soldier's office or employment.

- **Managing Performance**. Effective and dynamic procedures to be established to review soldiers' performance, providing feedback and establishing goals that are in line with the strategic vision and mission of MAF. This is very important to ensure that the soldiers are at the optimum level to perform well in their duties. Feedback is necessary to make sure that the programmes or processes that the soldiers are forced to follow are appropriate and relevant.

- **Diversity and inclusion in the Workplace**. As a multi-racial country, diversity is one the basic issues that can either be advantage or disadvantage to MAF depending on how the commanders deal with it. Promoting a diverse where they can accept each other and inclusive workplace where every soldier has access to equal opportunity, respect and a sense of belonging could become a challenge. Diversity aspect is not only to teach the soldiers to respect each other but also to develop the sense of the diversity makes them to complete each other.

- **Participation of Soldiers**. Creating a conducive and equipped workplace where soldiers are motivated, dedicated and content, which maximum output and high retention rates. The soldiers will have the feeling that they are appreciated thus they will actively participate more in any programmes and activities. Many steps can be taken to encourage each of the individuals to participate in whatever tasks or missions.

- **The Development of Leadership**. Fostering and developing leaders to lead strategic plans and motivate teams at all level of MAF to support their plans and gain mutual respect. Every soldier is a leader at different level. To be the good leader

does not mean that they have to give orders, sometimes they can lead others by becoming the good followers and let other to guide them.

HUMAN RESOURCES PLANNING

Obi (2015) suggested that if the human resources are planned effectively, it will produce positive results as follows:

- **Stability and Healthy Growth**. Planning for human resources effectively ensures an organisation's stability and continued growth. Because systematic steps have already been made to ensure the availability of brilliant and skilled soldiers whenever recruiting conducted in the service, commanders and leaders will no longer have to rely on obtaining talent merely when they need it. The soldiers are trained continuously to ensure they can produce the maximum output with the relevant skills.

- **Eliminate 'Indispensable Syndrome'**. An organisation runs the danger of losing skilled workers because they leave, retire, or are dismissed. In the absence of sufficient workforce planning, the organisation may find itself shorthanded when it needs critical personnel who could be challenging to replace. Planning for human resources effectively guarantees that there are enough resources available when they are needed to keep the business running smoothly.

- **High Morale Soldiers**. It will not be necessary to make unnecessary layoffs that negatively impact the organisation's reputation and soldiers' morale. The soldiers can work without having to worry about losing their jobs. Apart from that, to foster high morale of soldiers, *Badan Kebajikan Angkatan Tentera's* (BAKAT) role also important to visit and look after the family especially when the soldiers who are deployed for long period of time to the remote area or other country.

- **Cost Effective**. Planning for human resources effectively reduces overall labour costs by preventing needless shortages and surpluses of workers by taking the essential steps in advance. Strategic financial planning is crucial to ensure MAF are neither understaffing nor over over-employ.

CHALLENGES OF HUMAN RESOURCE

Human resource challenges are unavoidable. The challenges vary from time to time depend on the resources and the ability of MAF to deal with them. These are among the challenges:

- **Recruiting and Retention**. Recruiting fresh blood is a challenging process since the Baby Boomer generation has retired, Generation X is getting on in age, and the next generation is focused on making quick cash. It's still quite difficult to find and keep great talent. Because there is a strong competition for competent workers, companies must provide competitive pay and chances for professional growth in order to retain their finest staff. Failure of recruiting or service retention may result in understaffing which can be disastrous when maximum manpower is required, for example, when crisis hit our country such as COVID-19 pandemic, the country needed maximum involvement of armed forces personnel to support other government agencies. MAF must constantly conduct thorough assessment to compare the present resources and future needs in order to ensure MAF is neither understaffing nor overstaffing.

- **Diversity and Inclusion**. Although it can be difficult, encouraging diversity and inclusion in the workplace is crucial. In order to foster an inclusive workplace where all workers feel appreciated and respected, commanders must address bias and discrimination within their units. This is very difficult since transparency of the commander is required and the judgement is subjective.

- **Tasking and Deployment Planning**. Finding the ideal mix of soldiers and abilities to achieve organisational objectives is a never-ending task. Aligning human resource initiatives with the overarching strategy is a component of workforce planning. Every soldier has different characteristics, abilities and weaknesses. Good commanders must know how to channel the weaknesses into opportunities to benefit the organisation.

- **Engaging Soldier**. Maintaining soldier’s motivation and engagement is essential for retention and productivity. The management must create plans to improve work-life balance, recognition and job satisfaction. In order to keep talented soldiers and motivate them to perform at their highest level while

working, the financial, psychological, and even physical benefits must be continuously evaluated depending on MAF's budgets.

- **Efficient Management**. Efficient management of change is necessary when adjusting to organisational changes brought about by latest technology, reorganisations, mergers and other causes. Human resources are crucial in assisting soldiers with these changes for them to adapt themselves and contribute to it.

- **Culture of Workplace**. It might be difficult to create and preserve an inclusive and happy work environment. Building and maintaining a culture that reflects the organization's values is the responsibility of the management. The soldier must able to embrace and assimilate the culture of the workplace, similarly, the management must able to understand the philosophy behind the culture and ensure the soldiers are able to accept it.

- **Training and Development**. Success in the workplace and the advancement of employees depend heavily on ongoing learning and development. HR must develop efficient training initiatives and encourage a culture of learning. The purpose of evaluating the efficacy of training is to make sure it is affordable, to find out where changes or additions to the programme are needed, to uncover new needs and reorganise priorities, and, above all, to make sure the training's goals are being fulfilled.

- **Compliance and Rules**. Any organisation that wants to guarantee a secure, well-organized, friendly, empowering, and non-discriminatory work environment must have the policies and procedures in place. It is a constant struggle to manage adherence to labour laws, workplace safety rules, and other legal obligations. For the purpose of avoiding legal problems, HR must stay current on rules.

- **Use of Technology**. The modern era is driven by advancements in technology, inventiveness, and originality (Anastasiu et al., 2020). The evolution of contemporary technologies has impacted the nature of work. Robots are increasingly being used to complete routine jobs, which has benefits for increased production, improved quality, and decreased waste and accident rates. Even in tasks that are not conventional, some human contribution has been displaced by the development of artificial intelligence (AI) and the Internet of Things (IOT). Automation will decrease the number of

recruitments, which may be more productive by bringing contemporary communication and computer software, but it won't always remove jobs that have become outdated. Using and overseeing other software applications and the newest technologies can be difficult. HR is responsible for making sure these systems are functionally connected and fit the needs of the company.

- **Succession Planning**. It might be difficult to recognise and nurture potential leaders. In order to cover important roles when senior employees retire or leave, the management must make sure there is a talent pipeline. The succession plan is a must in the organisation not only for the leaders but also for the soldiers. This plan is to ensure that it will not be a vacuum phase between the change of leadership or skilled soldiers.

- **Health and Wellness**. The health of soldiers has become more important, especially in light of the COVID-19 outbreak. In addition to developing wellness initiatives that enhance general wellbeing, the management must handle issues with both physical and mental health. The Royal Medical and Dental Corps plays important role to conserve the fighting strength of the Malaysian Armed Forces in general but the commanders must exercise their duties to ensure all soldiers are at their maximum health level.

- **Compensation and Benefits**. It can be difficult to create attractive benefits and compensation packages that both attract and keep personnel. The management must strike a compromise between employee expectations and costs in order to maintain the capability and capacity of the forces and at the same time to avoid extra expenses to be incurred.

- **Statistics Analysis**. Making wise selections by utilising analytics and data is a constantly changing task. When addressing workforce-related concerns, management needs to adopt a more data-driven approach. All data in statistics must be analysed and interpreted effectively to produce the best solution.

In order to tackle these obstacles, human resources professionals must possess adaptability, knowledge, and creativity. Proactively recognising and resolving these problems to foster a positive workplace culture and assist organisational performance characterises successful human resource management.

FUTURE PLANNING

In order to achieve high value human resource empowerment in the present and future, proactive solution must be sought and comprehended with open minded from both top management and soldiers. There are three key priorities to be explored as suggested by International Labour Organisation which can be adopted to MAF (ILO) (ILO, 2022):

- **Manpower With the Right Skill**. Putting more efforts and investment in the hiring and retention of diverse, qualified soldiers is essential to success in order to deliver superior service. MAF needs to have agile, diversified, and motivated soldiers who are backed by efficient mobility and recruitment procedures due to the substantial change in the workplace in terms of speed, scope, and complexity. Due to the rapid rate of change, the competences and skills that are in-demand today may not be needed tomorrow. It is vital that management or top hierarchy to devise proactive methods for mapping present and future skill gaps and use stronger workforce planning systems. In order to anticipate demands and find solutions to keep the gaps narrow, cycle of strategic planning must be in place. This would facilitate the prompt posting and hiring of soldiers to ensure continuity and reduce the possibility of important positions remaining empty for long periods of time. The management must implement mechanisms that facilitate organisational and job design. These mechanisms must address matters such as the arrangement of abilities into a logical role, the number of positions needed for a certain work role as well as the locations. An efficient recruiting process begins with a well-written job description or Myportfolio for every vacancy which also serves as the foundation for future targeted delivery. It is not only applied to the new recruitment process but also when to promote or transfer a soldier to other post.

- **Empowerment and Respectful Working Area or Environment**. Create and sustain a workplace culture based on respect for one another, a zero-discrimination policy, and moral behaviour will enable soldiers to thrive and produce more and better results. In addition to being responsible for timely completion of work priorities, commanders play a critical role in enabling soldiers under their command to perform at a high level. It is imperative to furnish middle level commanders with a precise and fitting distribution of powers and duties in order to facilitate decision-making, enhance accountability, and optimise

performance management. The infrastructure, systems, and tools required to support their role will be provided, along with a continuous learning framework that emphasises formal education and skill development, on-the-job learning, mentoring, development assignments, networking, feedback, and coaching, for both current and future managers. In order for soldiers to realise their full potential, they should be able to benefit from excellent, specifically focused learning and development opportunities. All level of ranks should be able to clearly see and understand the connections that exist between career advancement, excellent performance, and soldier development. It is obvious that working models centred almost entirely on set working hours can be replaced with much better IT infrastructure, processes, and communication platforms. Innovative working practises have the potential to enhance soldier's health, happiness, and work-life balance as well as to make the workplace more welcoming to a varied, gender-balanced, and truly multinational workforce. Maintaining the highest standards of decency and moral behaviour at work will lessen the likelihood of improper behaviour and conflicts of any kind. A review of MAF internal policies and processes to detect and resolve discrimination as well as make sure that the unique needs and problems of diverse groups are recognised and met would support respect for diversity in all its manifestations.

- **Utilising Technology to provide Effective Human Resource Service**. In order for MAF to be more productive and high-quality in everything we do, we must keep up our efforts to modernise and optimise human resource procedures that connect people, process, and performance in the face of an external environment that is changing quickly and an increasing demand for efficiency and effectiveness. In order for MAF to be more productive and high-quality in everything we do, we must keep up our efforts to modernise and optimise HR procedures that connect people, process, a performance in the face of an external environment that is changing quickly and an increasing demand for efficiency and effectiveness. Using technology to enable new and more productive methods of working will be a key area of concentration for human resource strategy implementation.

CONCLUSION

In the MAF, human resource management (HRM) is a systematic strategy to hiring, developing, and motivating personnel. This specialised field works to ensure the success of MAF by reflecting and supporting the organization's basic values and developing a proper working culture through the introduction of programmes. Proactive rather than reactive management of human resources involves anticipating requirements and meeting them rather than waiting for instructions on hiring, compensating, or training staff members or handling issues when they come up. Many well-known duties including recruiting, selection, performance reviews, benefits administration, training, and management development, will be covered by the application's methodologies. Above this will be implemented specific initiatives aimed at enhancing dedication, involvement, and productivity as well as communication systems. Challenges in managing human resources need to be handle promptly because firstly, soldiers are seen as valuable resources in MAF, which suggests that it is important to devote time and resources to their growth. Secondly, soldiers are human resources, they cannot be viewed like material resources because they have unique qualities of their own. The strategy emphasises the necessity of bringing human values and humanity into organisational life. Thirdly, soldiers as individuals are not the only social realities, organisational units and processes that human resources consider. These include a soldier’s position within his unit, the several teams he is a part of, the procedures that take place between teams and the MAF as a whole.

Regardless the new technology or usage of artificial intelligence nowadays, human capital is still one of the most valuable assets in MAF. The core competencies of individual and group of soldiers are the skills that give added value to the services provided by MAF to serve the nation. Soldier as individual should have the right mix of transferrable skills (communication, cooperation, teamwork, and critical thinking) and professional skills (technical knowledge and experience), even if these vary depending on the unit's activity. This will help MAF maintain its human resource. We can no longer treat soldiers in antiquated ways. Soldiers are only effective when they comprehend, embrace, and take pleasure in their work. Issues could arise both before and during the hiring process. The strategic application of human capital may offer a long-term planning solution. Soldiers understand that, as long as they act responsibly and within moral bounds, they are not irreplaceable unless they possess essential skills that are difficult to replace. Actually, they are only a force if they remain a unit.

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MULTI-DOMAIN OPERATING ENVIRONMENT – LAND DOMAIN READINESS AND CHALLENGES

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INTRODUCTION

All countries, not only those in Asia, are impacted by the global danger of the twenty-first century. The combined army must operate several battlefields across large geographic distances and extended time horizons. While thwarting attempts by the enemy to attack ally soldiers, infrastructure, and people, the army aims to preserve the maximum amount of mobility, speed, and agility. Because of the current dynamic, dangerous, and global battling environment, sustainers provide help differently. The army's sustainment system is becoming an expeditionary enterprise that can undertake continuous, integrated, and globally coordinated operations. It is built on an end-to-end distribution system.

It is crucial to create sustainment capacity, precision, and robust logistics to provide fast power projection, MDO, and autonomous maneuver. Precision logistics, when properly used, results in forward support that boost material readiness, reduce inventory in accordance with the need to reduce demand, reduces costs, and provides a dependable, agile, and responsive sustainment capacity (Csengeri, 2021). Communication, swiftness, and agility are crucial for successful and effective execution. Military power must be able to endure hostile actions and adverse climatic circumstances in order to be effective. Without a durable logistics capability, army and combined forces are much less effective in a multi-domain battlefield.

MULTI-DOMAIN OPERATION

The phrase "multi-domain operations" is very recent in the field of military science. The paper focuses on the genesis, definition, and components of multi-domain operations. This growing trend has to be explored since terminology is shifting from multi-domain warfare across multi-domain operations to all domain operations other than phrases like cross-domain operations/effects. The word is analysed to see if it refers to a novel strategy for combat or if it just repackages an old idea. When the idea was first introduced as Multi-domain Battle in 2017, it was realised that the new strategy needed to take into account a far more complicated environment (Perkins, 2017). Air Land Battle

provided a framework for the battlefield that included deep, near, and rear to help solve the issue of how the military would defeat an enemy that outnumbered them. The structure of multi-domain combat must permit success in an ever more complicated environment. With smooth transitions from the battlefield to the home station and across various domains, the multi-domain conflict is creating an enlarged battlefield architecture to combat the breadth and depth of adversary capabilities. In the beginning, during the first few years of the MDO idea, it was known as Multi-domain Battle (MDB), after the name of the prior tactic of conflict, the Air Land (Air and Sea) Battle (ALB) (Perkins, 2017). By 2018, the idea had become firmly established and for a variety of reasons, had been rebranded to Multi-domain Operations.

Their goal is to continuously integrate across many areas while integrating capabilities across the combined force. The second is that you can't accomplish it by yourself. While the military can win battles and campaigns, the entire government must work together to win wars. Our interagency partners' familiarity and knowledge of our warfighting principles and doctrine is beneficial to the overall endeavour. Finally, it's never just about the battle. Nobody can compete with the military's combined weight with that of its friends and partners when it comes to war. The operational environment is changing, though, and nation-state competition has returned, as seen by recent steps taken by both China and Russia. It's critical to succeed in the "competition" that comes before and after conflict. The use of Multi-domain Battle, however, suggests that this idea was limited to the conflict phase. Despite the fact that there are conflicts inside the competition, winning them is useless if it is done outside of the greater framework of purposeful actions supporting national policy (Townsend, 2018).

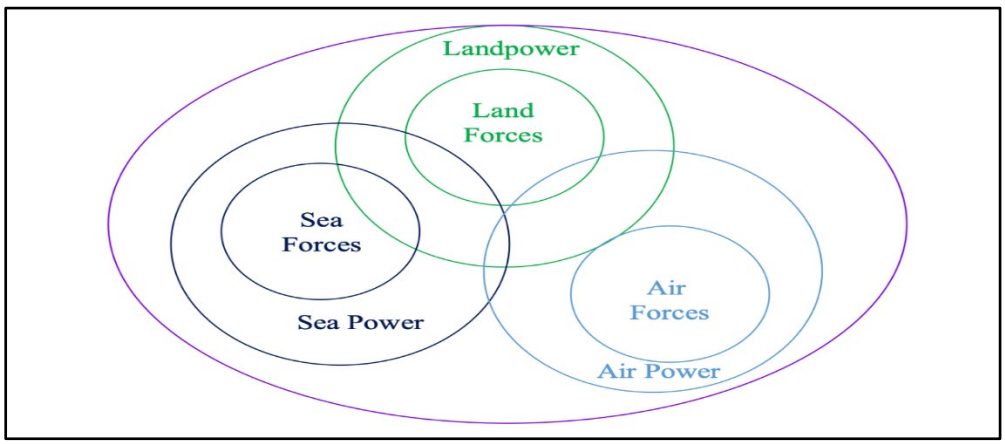

Figure 1: The Multi-Domain Operating Environment Between Forces

MULTI-DOMAIN OPERATING ENVIRONMENT - LAND DOMAIN

For land forces to be a successful partner, they must fundamentally rethink how they contribute to the common battle. Instead of behaving as a demanding consumer, they must become a real partner who can empower, represent, and assist the combined force. A novel idea known as the multi-domain combat will help ground troops in the combined conflict. The capacity of a commander to make the most of the tools available in and across all domains will be restored by this idea. Land forces can establish windows of superiority in the land domain and other domains by using this approach. The use of a variety of land-based cross-domain fires during multi-domain engagements will enable the combined force commander to completely control the targeted domains. Multi-domain combat aims to negate A2/AD (anti-access/area denial) capabilities of the enemy (Banasik, 2022). Jointness must be seen differently, yet it still holds the secret to defeating these systems. Joint activities today will be conducted in a far wider range of fields than they were in the past. Additionally, it is a jointness in which no armed service may exercise dominance and no realm has definite boundaries.

Additionally, ground troops can aid in reversing this tendency. They need to be built, outfitted, and taught to be competitive in all spheres, as well as to comprehend and adapt to the demands of the operational environment of the future. The land force must also alter the way it views its position within the unified force. Operating under the dominance of air and marine forces for the past 25 years, ground forces have been heavy users of combined force capabilities. The land force must now be able to provide and receive as well as assist operations in other domains if the unified force is to be successful. There has always been a liminal area between the realms ever since the concept of the joint battle gained popularity which called the gray zone or hybrid warfare. Warships and coastal artillery, for instance, have both been able to project power onto the land and the sea, respectively (Cordesman & Grace, 2020). These gray regions will become much larger in the near future thanks to technological advancements, maybe covering whole theatres. As a result, the range of future land forces will be so broad that physical separation between domains will become irrelevant.

Thus, land forces must view themselves as full partners capable of enabling, acting for, supporting, and managing operations in the other domains rather than merely as a recipient of aid from the other services. The notion of a multi-domain fight is based on this comprehension. Land forces may reassess their tactics and participate

more effectively to the combined war by utilising modern technology, such as precise missiles, long-range attacks, and sophisticated sensors. Multi-domain warfare will provide the joint force alternatives and possibilities while creating several problems for the enemy. Through land-to-sea, land-to-air, land-to-land, land-to-space, and land-to-cyberspace fires and effects, ground forces can dissuade, deny, and destroy the enemy. The combined commander will then be able to capture, hold onto, and use the initiative. Through its capacity to sense, recognise, and attack targets throughout the field of operations, the multi-domain fight will also improve the security of the unified force.

THE NEED FOR MULTI-DOMAIN OPERATION

Our greatest problem in mission command may be comprehending and understanding how to function in this operational environment that is becoming more integrated. The nature of war has evolved in the twenty-first century due to these conventional and asymmetrical methods. The majority of nations draw attention to how nonstate players have increased and how these developments in technology including artificial intelligence, hypersonic weapons, and robotics have altered the nature of conflict. Consideration must be given to the growing ambiguity surrounding the definition of war. Both the National Defence Strategy and the MDO concept uphold Carl von Clausewitz's view of the permanent nature of war, despite the fact that the nature of war is constantly changing (Lantis, 2002).

"As a total phenomenon, its dominant tendencies always make war a paradoxical trinity composed of primordial violence, hatred, and enmity, which are to be regarded as blind natural force; of the play of chance and probability, within which the creative spirit is free to roam; and of its element of subordination, as a tool of policy, which makes it subject to reason alone," he said in defining the nature or unchanging aspects of war. With its emphasis on violence, unpredictability, and political control, this remark captures the essence of war as we know it now. But in some ways, the lasting essence of war is put to the test by these so-called gray-zone conflicts. The notion of "violent action" is becoming more ambiguous in light of the merger of the cyber and space domains, yet violence will still be a feature of the battle.

Gray-zone activities can be seen as acts of war even when physical violence isn't involved, unless force is used instead of violence to force the opponent to comply with one's wishes. By defining these activities as being a component of competition below armed conflict, the MDO paradigm preserves the conventional understanding of war. This strategy is not necessarily incorrect because doctrine should be

clear if the armed force is to learn from its experience. The acknowledgment of rivalry underneath hostilities and unusual characteristics of war marks a substantial break from earlier ideas. The asymmetric or counterinsurgency conflict ranges have not received as much attention in the past as the large-scale ground combat operation (LSGCO) part of warfare (Balboni et al., 2020). To combat this tendency and enable successful mission leadership throughout military activities, an all-encompassing strategy must be used. We must make sure we can continue to practise conventional and irregular warfare and remain proficient at it.

The fact that MDO represents the next step in the development of joint and combined armaments combat is a second important feature of MDO. Since it has been in existence for many centuries, this idea has only grown in significance, coming into its own in the twentieth century. Lower tiers of conflict must also engage in joint and combined weapons combat. Currently, the brigade or a structure even lower than a brigade is the lowest combined arms formation in the military, as opposed to the division in the past. The edge has always gone to the side that can best organise its soldiers and resources to complete tasks on the battlefield. This norm remains the same; its breadth, depth, and complexity have only grown.

All of these elements, with the exception of information, are recognised by the Army as warfighting functions (WfFs). Information is considered a component of fighting strength by the army. The MDO idea aims to solve the issue of layered standoff by quickly and continuously integrating all areas of warfare in order to discourage and win as we compete without resorting to armed combat. If deterrence fails, army formations, working in tandem with other joint force members, try to breach and dismantle enemy anti-access and area denial systems, take advantage of the resulting freedom of movement to defeat enemy systems, formations, and goals, and accomplish strategic goals, and then consolidate gains to force a return to competition on terms that are more advantageous to the major power country, our allies, and our partners. By reorganising the military on the aforementioned fundamental principles, the MDO idea seeks to facilitate this tactic.

FUTURE PROSPECT OF MULTI-DOMAIN OPERATION

The four pillars of a defence strategy are power projection, establishing global security, domestic security, and decisive victory. Its armed forces continue to have possibilities to bridge the gap into the future of warfare by fighting on a multi-domain battlefield thanks to the global military presence brought about by this policy. The multi-domain war is a conceptual framework for imagining future combined military capabilities spanning the physical and psychological dimensions needed to counter a threat from a close ally in the nascent multi-domain operating environment (MDOE) of the twenty-first century. The cultural, technological, and military characteristics that influence the MDOE, the moral quandaries brought on by the development of disruptive technologies, the operational and strategic effects of dense urban environments on military objectives, and the roles of leaders and soldiers are important areas to take into account. The study in this piece attempts to provide readers with a thorough picture of the demands that will emerge for a future MDOE.

READINESS

Ensuring Army readiness is a constantly evolving process, transforming as required by foreign and domestic affairs. No matter the state of the world, military forces must be ready to conduct military operations and, if necessary, defeat all enemies. Readiness is essential to the Army and depends on how well units are manned, equipped, trained, and led. The Army Readiness Model " generates ready forces made available to Combatant Commanders for operations." (Perkins, 2017). The readiness in the military operation, especially in a multi-domain operating environment, is significant to defeat the enemy effectively with proper planning and execution. The need for MDOE in military strategies requires an application to meet the requests of their designated assignments or missions. The readiness is to ensure that the forces are ready and able to complete tasks at any time. Thus, this paper needs to review the military's readiness in MDOE, which involves the doctrines and training, technology and development; and allies in the multi-domain environment.

❖ New Doctrines Published

The planning and execution of military operations depend heavily on military doctrines, operational ideas used by the nation's armed forces, and operational principles. In recent

years, it has been seen that the military forces are increasingly shifting away from doctrines and ideas that train the army to combat terrorism in favour of concepts centred on facing enemies with enormous military, technical, and economic capabilities. Operational doctrines are not as broadly defined as military or war theories. A military doctrine may be seen as the process of planning the nation's defence in light of external threats or the conduct of military operations using the techniques and tools at the disposal of a specific nation or a coalition of nations. A war doctrine, on the other hand, is a collection of beliefs and principles relating to the planning and conduct of armed conflict that are viewed as a whole and take into account factors like the political structure of the state, domestic and foreign politics, available resources, economic opportunity, scientific and technological advancement, previous military experience, and geographical location (Maples, 2018). Operational doctrines, on the other hand, are produced in actuality by specialised military organisations or think tanks. Following the main military commanders' approval, they are then transformed into official strategy papers or field manuals, becoming binding doctrines.

A collection of rules and directives that control how land-based military operations are carried out are known as the doctrines of the land domain. According to Maples (2018), the military strategies, historical lessons, and organisational structures of each nation's armed forces are taken into consideration while developing these doctrines. However, they typically adhere to the following fundamental principles: combined armed operation, maneuver warfare, mission command, synchronisation with other domains, counterinsurgency operation, training and readiness, and joint and coalition operation. In order to produce complementary and synergistic effects on the battlefield, this doctrine strongly emphasizes integrating different ground force types, including infantry, armor, artillery, engineers, and other supporting elements.

Additionally, the doctrine supports decentralised decision-making, giving lower-level commanders the authority to make tactical decisions within the larger context of the mission (Maples, 2018). As a result, it is possible to react more quickly and adapt to changing circumstances. Land troops may receive training in counterinsurgency tactics to deal with irregular warfare and maintain peace in conflict zones. Continuous

training and readiness are essential to guarantee that ground forces are ready to respond to many situations and retain a high degree of operational capacity. It is crucial to remember that doctrines are always changing as to take into account of any changes in the security environment, technological advancements, and lessons learned from previous operations. The concepts of the land domain can therefore be updated and improved over time.

❖ Unlocking Training Technology

The multi-domain warfare idea will eventually detail these difficulties to a level where solutions may be devised, implemented, tested, and assessed, drawing on these complex and interrelated challenges. Setting up a battlefield structure is essential to reaching this degree of realism. A mental tool called a "battlefield framework" is used by commanders to execute mission command. Commanders may visualise, explain, direct, lead, and evaluate the deployment of combat power in time, place, purpose, and resources with the use of the correct battlefield framework. Previous frameworks won't be sufficient for these jobs when operating conditions evolve. A multi-domain battle's success depends on rethinking the framework of the battlefield.

Armed forces may gain major advantages, improve their capabilities, and maintain preparedness to address contemporary warfare's demands by successfully unlocking and integrating new technologies in a multi-domain operational environment. Success in this dynamic and complicated environment depends on constant adaptability, teamwork, and a forward-looking mindset. New technologies must be unlocked in a multi-domain operational environment for contemporary military operations to succeed and preserve a competitive edge. The MDOE's land domain includes research and development, technology scouting and collaborations, and cybersecurity consideration as some of the critical factors for successfully integrating new technologies.

Investing in research and development (R&D) is essential for locating and creating cutting-edge technologies that can improve capabilities in many fields. To push the limits of innovation, governments, defense organisations, and private businesses frequently work together on R&D projects. Adopting new solutions in the context of several domains can be sped up

by actively looking for emerging technologies and forming collaborations with forward-thinking businesses and start-ups. As technology grows increasingly integrated, cybersecurity issues become a major responsibility. In order to protect against cyber dangers, it is essential to incorporate strong protections into new technology, which is why cybersecurity is becoming stronger.

❖ Allies in Multi-Domain

Military strategies and international relations can evolve rapidly, and new initiatives or challenges may have emerged since then. Allies are nations or military forces forming cooperative partnerships to achieve common security or strategic objectives. In a multi-domain operating environment, allies refer to nations or military forces that have established collaborative partnerships to operate together across various domains of warfare. These domains typically include land, air, sea, space, and cyberspace. The concept of allies in a multi-domain operating environment is centered on enhancing military effectiveness, joint operations, and strategic cooperation among countries. They often engage in joint military exercises, share intelligence, and coordinate their efforts in times of crisis or conflict. As an illustration, utilising hybrid warfare to expand on destabilisation efforts in Eastern Europe enables U.S. and NATO allies and partners to assess a whole-of-society (WoS) strategy in an MDOE to forge and preserve a powerful alliance (Clas, 2018). Despite the fact that China's economic development rate makes it a likely front-runner to overtake the United States by 2050 or earlier, a Sino-Russian alliance might cause the balance of power to change more quickly. A WoS strategy includes all of the NATO alliance's member states as well as other social entities. Future dangers in the MDOE can be mitigated by using the MCE-AR as a catalyst to fortify the alliance between NATO allies and partner countries using a WoS strategy.

Create additional chances for allied and partner countries to become interdependent on one another, as well as chances for leaders to enhance their entrepreneurial leadership skills by solving organisational problems with originality and creativity. To find out whether combining a WoS approach with the MCE concept is a successful tactic against potential MDOE adversaries, for instance, a mixed-methods programme evaluation of the Mission Command Element for Atlantic

Resolve (MCE-AR) could be conducted (Clas, 2018). In the future MDOE, strengthening civil-military linkages through security sector governance and universal conscription may lead to shared buy-in, minimise ethical restrictions, and develop crucial new technical skills. Due to their major power status, it is unclear if China, Russia, or a mix of both will be the two near-peer opponents in the future. As a result, additional research should be done on examining WoS possibilities to support social inclusion by merging security sector governance and universal conscription. Overall, allies in a multi-domain operating environment aim to leverage their collective strengths, expertise, and resources to enhance security, deter potential aggressors, and effectively respond to complex threats and challenges in an increasingly interconnected world.

CHALLENGES

The land domain in a multi-domain operating environment faces several unique challenges that must be addressed to ensure successful and effective military operations. These challenges can arise in conventional and non-conventional warfare scenarios and have implications for strategic planning, operational execution, and overall mission success. Addressing these challenges involves a combination of technological advancements, joint training, doctrine development, and effective leadership. Multi-domain operations require close coordination and integration across various military services to achieve mission success in a rapidly evolving and complex security environment.

❖ Cyber Threat

To address these challenges, land forces must prioritize cybersecurity as an integral part of their operations. This involves implementing robust cybersecurity measures, conducting regular training and simulations to improve cyber resilience, fostering a culture of cyber awareness among personnel, and collaborating with cybersecurity experts to stay ahead of evolving threats. Additionally, coordination with other military domains and agencies is essential to create a holistic approach to cybersecurity in multi-domain operations (Gady & Stronell, 2020). Like other domains, the land domain is susceptible to cyber threats that can disrupt communications, compromise information security, and potentially disable critical systems. Protecting against cyber-attacks and ensuring cyber resilience is crucial. Cyber threats pose significant challenges to

the land domain in modern military operations. As technology becomes more integrated into military systems, the potential for cyber-attacks on land forces increases in information security as cyber threats can target communication networks, information systems, and databases, potentially compromising critical information and intelligence. Protection of sensitive data from unauthorized access or cyber espionage is paramount.

Besides, the threat could happen towards attribution and response of the networks. Thus, the response to identifying the source of cyber-attacks can be challenging, mainly when adversaries use sophisticated tactics to conceal their identities. On the other hand, the cyber threat also risks the weapon system vulnerabilities and electric warfare and jamming the system in land domains environment. The land forces with updated technology systems, such as armored vehicles, are the most effective land comprising electrical, mechanical, electronic, and weapon engineering system. In this context, the cyber threat could cause electronic warfare with jammed communication channels, radar systems, and other electronic devices crucial for land operations. Therefore, the effectiveness of the system is disrupted and affects cyber security. While in a hybrid warfare scenario, cyber-attacks may be combined with conventional military actions to create complex and multifaced challenges for land forces.

❖ Command and Control

Addressing these challenges requires continuous evaluation and refinement of Command and Control (C2) structures, investments in advanced communication technologies, cybersecurity measures, and a strong emphasis on training and leadership development. Additionally, fostering a culture of collaboration and adaptability is essential for successful C2 in the land domain. Coordinating and managing command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) assets across different domains while maintaining real-time situational awareness is a complex task that requires sophisticated C2 systems (Alberts, 2018). Cyber-attacks on C2 systems can disrupt communication and hinder the ability to effectively coordinate and direct land forces. C2 is a critical aspect of military operations, including land-domain ones. While effective C2 for successful execution, it also presents specific challenges in the land domain, such as decentralization and centralization,

communication and information flow, interoperability, cyber-security and resilience, training and leadership development, and civil-military coordination.

For decentralization and centralization, land operations often involve dispersed and geographically diverse forces to balance the need for decentralized decision-making at the tactical level with centralized coordination and direction at the operational and strategic levels, which can be challenging. Next is the communication and information flow, establishing reliable and secure communication channels across varying terrains and environments. Ensuring continuous and real-time information flow between different echelons of command can be complex. In interoperability, the C2 systems between land force units and allied and coalition partners are vital for effective coordination and collaboration during joint operations. While for cybersecurity and resilience, the C2 systems are vulnerable to cyber threats, including hacking, data breaches, and denial of service attacks. The constant challenge is conducted to ensure the security and resilience of these systems against cyber threats. Effective C2 relies on well-trained personnel who can make informed decisions under pressure for training and leadership development. Thus, developing competent leaders and providing ongoing training for C2 is crucial. Lastly, the civil-military coordination in certain scenarios of land forces may need to coordinate with civilian authorities or humanitarian organizations, which requires effective civil and military relations and C2 integration to provide good communication.

❖ The Duration Training Platform

Even within a single military service, large-scale training might need striking a balance between centralised coordination and decentralised goals. With MDO, maintaining this equilibrium might be particularly challenging. The difficulty is related to both organisational management and technological R&D, and it may get worse as more organisations are linked. The underlying training objectives should inform the supporting capabilities (Marler, 2020). Effective technology, then, fits the intended function. But frequently, technology may advance as a consequence of an industry drive rather than in reaction to consumer desire. Before pursuing a market, developers could improve or perfect a capacity. However, in general, when goods are developed from and tailored to end consumers' demands, they can be more successful. This is particularly true with

training technologies, which work best when created with a specific training purpose and user population in mind.

Training goals change as the user base grows and gets more complicated. Usually, a single training capability cannot respond to objective that are significantly different. Consequently, a conflict between centralised coordination and decentralised requirements is occured. The various training requirements of a large organisation might support possibly decentralised training goals. Training can become ineffective if these separate objectives are disregarded or mixed together, even if they may be genuine. However, if left unchecked, this circumstance may result in siloed development, where different organisations autonomously pursue R&D to exclusively meet their particular objectives. This runs the danger of duplicating work and squandering money as a result. Additionally, it runs the danger of passing up chances to exchange best practises for R&D, procedures, and training objectives across several organisations. Therefore, centralised coordination at some level could be advantageous for overall involved parties.

In addition, having a single organisation track and share information about technological advancements may be useful for coordination. However, in the case of enormous organisations that could develop naturally, this objective may go against human nature. For instance, even though each military branch may have a training organisation, R&D and the use of training capabilities within the branch may not be well-defined and widely transparent (Marler et al., 2020). It could take constant effort to ensure proper coordination throughout a service. Applying to more echelons and organisations may increase the difficulty of balancing distinct training objectives with coordinating efforts. In this aspect, it can be useful to think of training as a continuum, with complexity rising as it moves from interactions between a single individual to interactions between people, organisations, services, combatant commands, and eventually countries (allies and partner states). The joint community, where services are required to integrate in order to train while they battle, is fully aware of this difficulty (Marler et al., 2020).

The introduction of several operating settings and domains can make these complications even more difficult. Complex scenarios involving disparate surroundings and several disciplines might arise and necessitate intensive training

coordination. MDOs can therefore be particularly difficult to simulate and plan for. A matrix of complexity with two axes indicating an increasing number of operational domains and complexity of interacting organisations results when training covers not only the continuum of organisational complexity mentioned above but also crosses combat domains.

CONCLUSION

At first glance, the idea of a multi-domain battle may appear to be no different from conventional joint operations. This has some basis in reality. It is not altogether novel to strive for cross domain impacts. MDO battle's framework must allow victory in an even more complex world. MDO battle is developing an expanded battlefield framework to fight across the breadth and depth of enemy capabilities, seamlessly reaching from the battlefield to home station and across multiple domains. By 2018, the concept was quite settled and was renamed, as we mentioned earlier, Multi-domain Operations for numerous reasons. Firstly, the concept is truly joint and multi-service, which needs clarification and alignment in how they talk. They are committed to converging capabilities across the joint force with continuous integration across multiple domains. Secondly, the operation cannot be done alone so that the armed services can win battles and campaigns, but winning wars takes the whole government. It helps the entire effort if our interagency partners are comfortable with and conversant in our warfighting concepts and doctrine. Lastly, MDO is not just about the fight. When it comes to combat, no one is better than the combined weight of the military and the allies and partners.

But as the operational environment changes, nation-state competition has returned among the main power nations. Winning the competition that comes before and after conflict is critical. To make MDO as a new technology on the battlefield effective, preparation and difficulties are crucial. However, the employment of the MDO combat appears to show that this notion was merely for the conflict phase with a wider background of purposeful operations supporting national policy. Numerous studies are required to assess and evaluate for potential future reviews in technological advancement.

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MULTI-DOMAIN OPERATIONAL ENVIRONMENT – HUMAN RESOURCE READINESS AND CHALLENGES

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INTRODUCTION

"Ultimately, the aim of such a multi-domain environment is to achieve decisive advantages through the joint coordination of forces." – **Emerson**

Multi-Domain OperationEnvironment (MDOE) refers to an all-encompassing operational framework where multiple interconnected domains, such as land, air, sea, information, and space, are used to conduct complex military operations (William 2020). This operational environment requires a comprehensive view and understanding of the overall operational situation in which military forces are involved in order to effectively wield all capabilities available to them. This concept of MDOE has become increasingly important as the ongoing globalization and technological advancements have made it easier for potential adversaries to gain access to increasingly threatening capabilities. The MDOE concept also augments the traditional notion of battle space by emphasizing the need for inter domain coordination and integration, as well as cross-domain synergies, in order to achieve operational success.

In order to successfully implement an operation that involves MDOE, the ability and competence of personnel must be prioritized. The military personnel must be equipped with the knowledge, skills and necessary abilities for Multi-Domain Operations(Girgis A, 2019). Human resource readiness must also involve a comprehensive assessment of the physical and mental capacity of the personnel involved in Multi-Domain Operations. This includes assessing the physical fitness, leadership abilities and military training that the personnel possess. Personnel must be trained to be flexible, have the necessary skillsets and have the capacity to adjust to any operational changes that may arise. Personnel also possess an understanding of legal implications, the rules of engagement and ethical conduct. Personnel must also understand the importance of collaboration and partnering with other military services, international allies and partnering organizations. All of these elements are necessary to ensure the success of all Multi-Domain Operations.

The article will focus on discussing on the readiness and development of human resources in the ground military organization that is capable of operating in various complex domains as well as aspects of the training approach and the challenges that will be faced in achieving the goals. At the initial level, will provide an understanding of the characteristics and concept of MDOE operation to identify the quality standards that personnel must have. In order to meet the standard, there will definitely be many challenges that will be faced to realize the need for ready-made human resources to be mobilized in the MDOE.

CHARACTERISTICS OF MULTI-DOMAIN OPERATIONENVIRONMENT

These characteristics highlight the unique nature of MDOE, emphasizing the need for integrated planning, coordination and execution across domains to achieve mission success (Brejcha, 2020). The characteristics of a MDOE include:

- **Integrate of Multiple Domains**. A Multi-Domain Operationenvironment involves the integration and coordination of operations across various domains, such as land, sea, air, space and cyberspace. It recognizes the interdependencies and interactions between these domains to achieve mission objectives.

- **Complexity and Interconnectedness**. Multi-Domain Operationsare characterized by their complexity and interconnectedness. Actions in one domain can have direct or indirect effects on other domains. Understanding these interrelationships and managing the complexities are crucial for successful operations.

- **Information Sharing and Fusion**. Multi-Domain Operationsheavily rely on information sharing and fusion across domains. It involves the collection, analysis and dissemination of relevant information to enable situational awareness, decision-making, and coordinated actions across all domains.

- **Integrated Planning and Execution**. Multi-Domain Operationsrequire integrated planning and execution processes. Planning must account for the capabilities and limitations of each domain, synchronize actions across

domains and establish effective command and control structures to coordinate operations.

- **Interoperability and Jointness**. Interoperability and jointness are critical in a Multi-Domain OperationEnvironment. This refers to the ability of different domains and services to operate together effectively, share information seamlessly and integrate their capabilities to achieve common objectives.

- **Technology Integration**. Multi-Domain Operationsleverage advanced technologies and systems to enable integrated operations across domains. This includes technologies such as networked communications, advanced sensors, data fusion, autonomous systems, and advanced weaponry.

- **Adaptable and Agile**. Multi-Domain Operationsrequire adaptability and agility to respond to rapidly changing operational conditions. Forces must be capable of adjusting plans and actions in real-time, exploiting emerging opportunities and countering evolving threats.

- **Scalability and Flexibility**. Multi-Domain Operationsneed to be scalable and flexible to accommodate different levels of conflict and various operational scenarios. Forces should be capable of scaling operations up or down based on the requirements and adapting their approaches to the specific situation.

- **Continuous Learning and Evolution**. Multi-Domain Operationsrequire a culture of continuous learning and adaptation. Forces must continuously assess lessons learned, incorporate new technologies and concepts and evolve their tactics, techniques and procedures to stay ahead of adversaries and remain effective in dynamic environments.

THE CONSEPT OF MULTI-DOMAIN OPERATIONENVIRONMENT

Multi-Domain Operationis a concept that addresses increasingly capable adversaries who pose strategic risk to U.S. interests before and after the initiation of armed conflict. It postulates “how the Army as part of a joint force, will operate against peer adversaries to maintain U.S. interests, deter conflict and when necessary, prevail in war.” (Brig Jen Randall McIntire, 2020) The Multi-Domain Operationsobjectives to compete short of war, turn denied spaces into contested spaces, defeat

the enemy campaign and consolidate gains. These objectives must be pursued and achieved in a contested environment of increased lethality, complexity and challenged deterrence that extends from local areas to across continents.

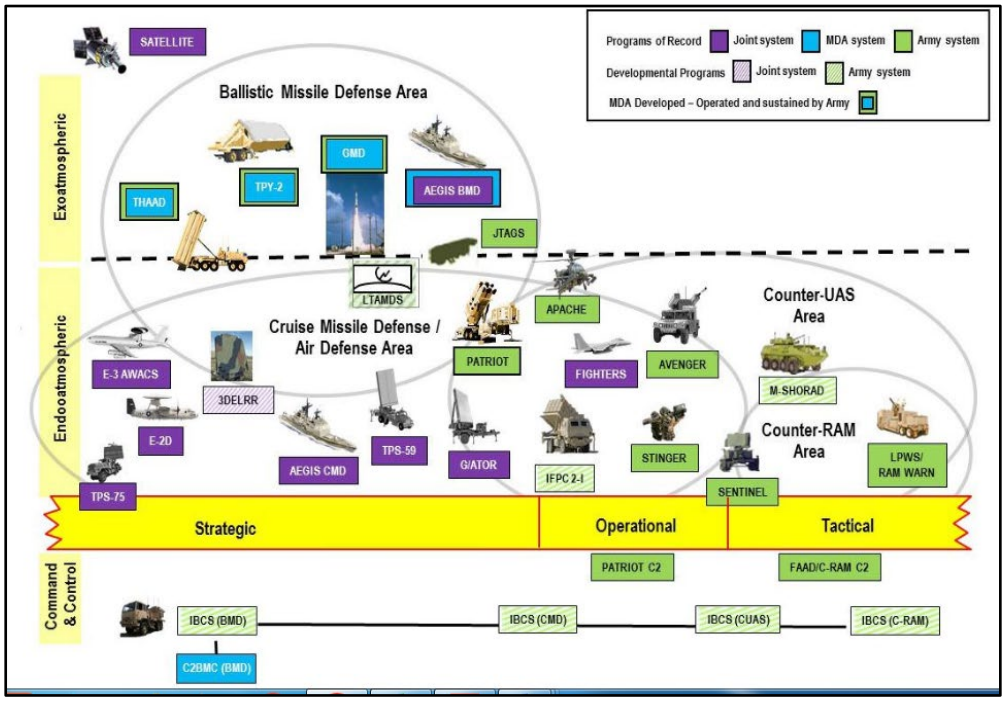

Diagram 1: The Concept of Multi-Domain OperationEnvironment

MDOE, the concept of command and control refers to the management and coordination of operations across multiple domains. It involves establishing effective command structures, communication networks and decision-making processes to ensure the seamless integration and synchronization of activities in different operational domains. From a command and control point of view, the MDOE can be categorized into three levels (William, 2020).

At the strategic level, command and control focus on long-term planning, policy-making and high-level decision-making. This level involves senior leaders, such as heads of state, senior military officials and top-level staff. The strategic level sets the overall direction and objectives for multi-domain operations, allocates resource and determines priorities. It involves strategic decision-making related to the allocation of forces and capabilities across domains, strategic communications and engagement with political and diplomatic entities. The strategic command and control structure ensures alignment with

national and international objectives and enables effective coordination and synchronization of multi-domain operations.

The operational level involves the planning and execution of Multi-Domain Operationswithin a specific theatre or area of operations. At this level, command and control are carried out by operational commanders and their staff. They translate strategic objectives into actionable plans and coordinate the activities of various forces and assets across domains. The operational command and control structure focuses on integrating the capabilities and efforts of different domain-specific units, such as land, air, sea, space and cyber, to achieve operational objectives. It involves coordinating joint operations, conducting intelligence fusion and analysis, allocating resources and managing the battle space. The operational level ensures effective synchronization and integration of forces, intelligence, and logistics across domains to achieve operational success.

The tactical level involves the execution of operations at the lowest level, where forces are directly engaged in combat or specific tasks. Command and control at the tactical level are carried out by tactical commanders and their units. This level focuses on the immediate implementation of plans, coordination of actions and decision-making in dynamic and rapidly changing environments. Tactical command and control involve tasks such as manoeuvring forces, employing weapon systems, conducting reconnaissance and engaging with enemy forces. It requires effective communication, situational awareness and decentralized decision-making to respond to threats and exploit opportunities. The tactical level ensures effective coordination and synchronization of activities within specific domains and contributes to the overall success of Multi-Domain Operations.

The effective command and control in MDOE require clear lines of authority, timely and accurate information sharing, robust communication networks and agile decision-making processes. It also necessitates interoperability among different domain-specific units, common operational procedures and a shared understanding of mission objectives. The command and control structures at each level work together to enable effective coordination, integration and synchronization of activities across domains, maximizing the operational effectiveness of multi-domain operations.

THE HUMAN RESOURCE READINESS IN MULTI-DOMAIN OPERATIONENVIRONMENT

The relationship between human resource requirements and a MDOE is closely intertwined. Human resource requirements refer to the specific skills, knowledge and capabilities that personnel need to possess in order to effectively operate in a multi-domain operational context (Seaman,2004). The successful execution of Multi-Domain Operationsheavily relies on the availability and proficiency of the right human resources.

The Malaysian Army needs to move agile to support the goal of a security, sovereign and prosperous Malaysia as stated in the Defense White Paper. An addition, the Malaysian Army also needs to support an integrated, agile and focused Armed Forces posture in line with the national military strategy. Therefore, the main objective in Army is readiness (29th Chief of Army, 2023). Malaysian Army will develop into an owned force optimal readiness that is able to exploit all elements of its capabilities and combat power in defending sovereignty and protecting interests' country. Army has optimum readiness that is able to exploit all elements of its capabilities and combat power in defending sovereignty and protecting national interests. Through the core of increasing readiness, increasing the competence of human resources in spiritual, scientific and physical aspects. To ensure the readiness of human resources meets the army's knowledge-based aspirations, the army stresses that the army actively and consistently enhance the competence of human resources in spiritual, scientific and physical aspects. In connection with that, military professional education and training should be directed to increasing the level of professionalism in order to make this organization more integrated, agile and focused and competitive.

Through the second objective which is organizational sustainability, the army will put emphasis on having a sustainable organizational structure. It involves the strengthening of knowledgeable, skilled and high attitude human resources which is the basis of forming heroes and soldiers who have high combat power. Achievement of readiness will guarantee sustainability of an intact organization as well as capable of providing response options. Army training institutions improve the quality of training based on the army training philosophy for the development of thinking soldier by adopting the latest innovation and technology in forming a knowledge-based army. This initiative and approach is to make army citizens who have high order thinking skill. Here are some key aspects of their human

resource readiness consideration to able deploy in Multi-Domain Operation:

- **Operational Capability**. Human resource requirements directly impact the operational capability of a multi-domain force. The skills, expertise and qualifications of personnel determine the force's ability to operate effectively in various domains, such as land, air, sea, cyberspace, and space. Adequate recruitment, selection, and training processes are necessary to ensure that the force has the right personnel with the required competencies to accomplish mission objectives.

- **Mission Planning and Execution**. Human resource requirements play a significant role in mission planning and execution. Personnel with domain-specific knowledge and expertise contribute to the development of operational plans that leverage the strengths and capabilities of each domain. Their understanding of the operational environment, tactics, techniques and procedures specific to each domain allows for effective integration and synchronization of efforts across multiple domains.

- **Cross-Domain Collaboration**. Multi-Domain Operationsnecessitate close collaboration and coordination between personnel from different domains. Human resource requirements include fostering a culture of collaboration and teamwork, ensuring effective communication channels and promoting the exchange of information and ideas across domains. Personnel must possess the interpersonal skills necessary to work collaboratively with individuals from diverse backgrounds and domains.

- **Command and Control**. Effective command and control structures are essential in Multi-Domain Operations. Human resource requirements encompass leadership capabilities, decision-making skills and the ability to exercise command authority across domains. Personnel in leadership positions must possess a comprehensive understanding of Multi-Domain Operationsand the ability to integrate efforts, allocate resources and make timely decisions to achieve mission success.

- **Training and Development**. Human resource requirements involve establishing robust training and development programs to enhance the skills and knowledge of

personnel in multi-domain operations. Training should focus on building domain-specific expertise, as well as developing cross-domain competencies, such as joint operations, interoperability and integrated planning. Continuous learning, professional development and exercises that simulate multi-domain scenarios are essential to keep personnel updated and prepared for evolving operational challenges.

- **Resourcing and Readiness**. Human resource requirements also extend to resourcing and readiness considerations. Personnel must be adequately equipped, sustained and supported to carry out multi-domain operations. This includes providing the necessary equipment, technology, logistics and infrastructure support across domains. Additionally, personnel readiness involves factors such as physical fitness, mental resilience and the ability to adapt to dynamic and demanding operational environments.

The requirement human resource requirements and a MDOE is foundational. The availability of personnel with the right skills, knowledge, and capabilities, coupled with effective training, leadership, collaboration and support, is crucial for the successful execution of Multi-Domain Operations. By aligning human resource requirements with the operational context, organizations can optimize their capabilities and maximize mission effectiveness in complex multi-domain environments.

THE CHALLENGES HUMAN RESOURCE IN MULTI-DOMAIN OPERATIONENVIRONMENT

Personnel in MDOE face several complex challenges. Some of the challenges faced by personnel in MDOE involve the interaction of various different battle domains (McDonald, 2005). Personnel must understand the complexity of the operational environment, including different tactics, techniques and procedures in each domain. They need to have a deep understanding of the strengths and limitations of each domain and how they interact with one another. Coordination between different battle domains is a major challenge in multi-domain operations. Personnel must be able to communicate, share information and coordinate with counterparts from different domains. This requires a good understanding of the language, procedures and practices within each domain.

Personnel must understand and integrate tactics and strategies across domains to achieve aligned operational objectives. Good synchronization between operations in different domains is crucial to ensure that efforts support one another and achieve synergistic effects. Personnel must be able to work collaboratively with personnel from different domains and operational units. They need to be able to adapt to diverse environments and integrate their capabilities effectively to achieve operational superiority together.

MDOE often involve the use of advanced technologies and complex weapon systems. Personnel must be able to master and operate communication systems, sensors, data processing devices and other technologies that support multi-domain operations. This requires high levels of technical skills and knowledge. Multi-Domain Operationsalso challenges in the realm of cybersecurity (Mishra A, 2009). Personnel must be aware of potential cyber threats that may arise in Multi-Domain Operationsand have an understanding of best practices in protecting systems and data from cyber-attacks.

Multi-Domain Operationsrequire comprehensive cross-domain knowledge and training. Personnel must master the principles and concepts of operations in different domains and be able to adapt quickly to changing situations. Multi-Domain Operationsoften involve high-stress and high-intensity situations. Personnel must be able to cope with high levels of mental and physical pressure, maintain physical fitness and sustain resilience in carrying out their tasks effectively

These challenges highlight the demanding nature of Multi-Domain Operationsand emphasize the need for personnel to possess a wide range of skills, including domain-specific knowledge, adaptability, effective communication, coordination and the ability to operate in complex and dynamic environments (Mishra A, 2009). Addressing these challenges requires continuous training, collaboration and the development of Multi-Domain expertise among personnel. With implementing some of actions taken, organizations can enhance the competence and capability of human resources in MDOE, ensuring they are well prepared to meet the challenges and complexities of such operations. Improving the competence and capability of human resources in MDOE requires a systematic approach. To facing human resource challenges in the implementation of this MDOE, increased knowledge and competence can be fostered in terms of integration, technological development and increased training must be in line with the Army's Operational Doctrine. The Army Headquarters level such as Army Operational and Training

Departments and Army Training Institutes need to synchronize the objective requirements and the implementation of the MDOE. Several steps can be taken to ensure that human resources are always ready to operate in a Multi-Domain Operation Environment.

The government should invest in research and development activities related to Multi-Domain Operations. This includes funding research projects, establishing research centers and supporting academic institutions to conduct research on emerging technologies, operational concepts and best practices in Multi-Domain Operations. They need to provide clear guidance, policies and resources to support training, education and career advancement opportunities. They also must collaborate closely with military institutions to align training programs, curriculum development and career progression pathways with the requirements of multi-domain operations. This collaboration ensures that the education and training provided by military institutions are relevant, up to date and effectively prepare personnel for the challenges of Multi-Domain Operations.

Clearly identify the specific competencies and skills needed for personnel to excel in MDOE. This can be done through job analysis, consultation with subject matter experts and an understanding of the operational requirements. Develop leadership skills and competencies among personnel. Effective leadership is crucial for coordinating Multi-Domain Operations and making informed decisions. Provide leadership development programs that focus on cross-domain leadership, critical thinking, problem-solving and effective communication. Establish a performance evaluation system that measures the competence and capability of personnel in multi-domain operations. Provide regular feedback to individuals, highlighting strengths and areas for improvement. Use the evaluation results to identify training needs and opportunities for professional growth

Design and implement comprehensive training programs that address the identified competency requirements (Seaman, 2004). These programs should cover various aspects such as domain-specific knowledge, cross-domain integration, coordination, communication, decision-making and adaptability. Conducting integrated training exercises that simulate Multi-Domain Operations is crucial. These exercises should involve personnel from various domains working together in realistic scenarios to enhance coordination, interoperability and decision-making skills. Use a combination of classroom training, simulations, exercises and practical hands-on experience to enhance learning outcomes. Create a culture of continuous learning and professional development. Provide opportunities for personnel to

attend workshops, seminars, conferences and specialized courses related to multi-domain operations. Support self-directed learning through access to relevant resources, online learning platforms and professional networks. Pair experienced personnel with junior or less-experienced personnel to provide guidance, share insights and transfer knowledge. Mentorship and coaching programs help accelerate the development of competence and capability in multi-domain operations.

Promote collaboration and interaction between personnel from different domains. Encourage joint training exercises, cross-domain assignments and knowledge-sharing platforms to facilitate better understanding, cooperation and interoperability. Foster partnerships and collaborations between the military, industry and academic agency. This can involve sharing knowledge, expertise and resources to address the challenges and technological advancements in Multi-Domain Operations. Industry and academic agency can provide valuable insights and contribute to the training and development of human resources.

Equip personnel with the necessary technical skills and knowledge related to Multi-Domain technologies and tools. Ensure personnel have access to and are familiarized with the latest advanced technologies used in multi-domain operations. This can involve hands-on experience with equipment, simulation tools and virtual training environments. Regular technology updates and refreshers should be provided to keep personnel up to date with the evolving technological landscape. Establish a structured process for evaluating and adopting advanced technologies in Multi-Domain Operations. This ensures that personnel have access to the most relevant and effective technologies and enables them to develop competence in utilizing those technologies for operational advantages.

CONCLUSION

The human resource readiness is of utmost importance in the concept and framework of MDOE. It involves ensuring that personnel are adequately trained, equipped and organized to effectively operate across various domains such as land, sea, air, space and cyberspace. The concept and framework for human resource readiness in Multi-Domain Operations encompass several key elements. These include comprehensive training and education programs, fostering interdisciplinary collaboration, cultivating adaptability and flexibility, integrating advanced technologies, developing effective leadership and command structures and addressing the psychological preparedness and resilience of personnel. Focusing on these aspects,

military organizations can enhance their readiness to navigate the complexities of Multi-Domain Operations. Human resource readiness enables personnel to effectively coordinate and synchronize efforts across different domains, leverage emerging technologies, adapt to changing circumstances and successfully carry out missions in dynamic and adversarial environments.

These challenges require a comprehensive and coordinated approach. It involves ongoing investment in training and education programs, fostering a culture of collaboration and adaptability, prioritizing technology integration, developing effective leadership and ensuring the allocation of resources aligns with mission requirements. By recognizing and proactively addressing these challenges, military organizations can enhance their human resource readiness in MDOE and effectively respond to the complexities of modern warfare.

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THE READINESS AND CHALLENGES OF LAND DOMAIN IN MULTI-DOMAIN OPERATING ENVIRONMENT

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INTRODUCTION

Multi-Domain Operating Environment (MDOE) refers to a military concept and strategy that recognizes the interconnected and overlapping nature of various domains of warfare in modern conflict. Traditionally, warfare was classified into specific domains, such as land, sea, air, space, and cyberspace. Each domain was largely considered independently when planning and executing military operations. However, in the contemporary security landscape, conflicts often go beyond these traditional boundaries. The core idea behind MDO according to Garn (2019) is deeper integration of capabilities across domains and also known as cross domain synergy. This approach is needed to achieve convergence of time, space, and capabilities to execute independent manoeuvre and use cross-domain fires, including integrated kinetic and cyber strikes.

Adversaries can exploit vulnerabilities in one domain to gain advantages in another, making it necessary for military forces to operate across multiple domains simultaneously and in coordination. This is where the concept of multi-domain operations comes into play. Key features and components of a MDOE include 1) Integration, 2) Interdependence, 3) Joint Operation, 4) Information and Decision Dominance, 5) Technological Advancements, 6) Strategic and Operational Flexibility, 7) Countering Anti-Access/Area Denial (A2/AD) Strategies, 8) Logistic and Sustainment, 9) Training and Education, and 10) Allied and Coalition Cooperation (Ionita, 2022). In the past, military operations often focused on a single domain be it on land or air. However, Csengeri (2021) stated that modern warfare recognizes that conflicts are more likely to occur across multiple domains simultaneously where integration play a vital role.

Integration involves the seamless coordination of forces, assets, and capabilities from different domains to achieve strategic objectives and generate interdependence. MDOE in many ways emphasizes the integration of capabilities and assets from various domains to achieve operational and strategic objectives. This integration involves the joint coordinated use of forces, intelligence, technology, and logistics across five-warfighting. All domains are now increasingly interdependent and

MDOE recognizes that actions in one domain can have direct and indirect effects on other domains (Bowers, 2022). For example, cyberattack can disrupt communications in the land or sea domains, and satellite operations in space can affect navigation and communication across all domains. The current strategy for military operations places a strong emphasis on the use of joint operations, which entail the coordinated use of various force categories with the goal of attaining unity of effort and leveraging the strengths of each category (UK MoD, 2020).

Commanders can integrate, synchronize, and manage joint operations with the help of the joint functions, which are related capabilities and actions. Thus, timely and accurate information is central to MDO. The joint operations make use of innovative technologies like communication networks, information, surveillance, and reconnaissance (ISR) systems, precision guided munitions, or unmanned systems where joint task forces and commands are established to facilitate coordination and synergy among various military services (Manolache, 2023). The ability to collect, analyze, and disseminate information rapidly is crucial for decision-making and situational awareness across domains.

Achieving information dominance is a key objective using technological advancements (Wojtowicz & Krol, 2019). According to Joachim (2021), the introduction of technological changes and new armed combat methods have greatly expanded the capabilities of military forces in multiple domains. For example, unmanned aerial vehicle have revolutionized land and air operations. Apart from that, space-based assets, such as satellites has provided critical communication, navigation, cyber and reconnaissance capabilities have greatly expanded and support the capabilities of military forces in MDOE. These technologies are leveraged to gain an advantage in MDOE. MDOE calls for flexibility in strategy and tactics where leaders must be able to adapt quickly to changing circumstances and shift resources between domains as needed to exploit vulnerabilities or respond to threats. Adversaries often employ A2/AD strategies to deny access to or control of specific regions or domains. MDOE involves strategies and tactics to overcome these challenges and maintain operational freedom (Fox, 2020).

Maples (2018) indicate that effective logistics and sustainment practices are essential to ensure that forces have the necessary resources, support, and infrastructure to conduct operations successfully across these domains. Rapid deployment of forces and resupply across various domains is essential for maintaining

operational tempo, efficient financial management and resource allocation for sustaining logistics and sustainment efforts within budget constraints. Soldiers and leaders will undergo continuous training and education that focus on developing the skills, knowledge, and adaptability required to conduct joint and integrated operations across multiple domains. This includes understanding the capabilities and limitations of different domains and the ability to adapt to rapidly changing situations. Training and education in MDOE are critical for preparing military forces to operate effectively in complex, interconnected, and rapidly evolving operational environments (Simerly, 2018). Apart from that cooperation with allied nations and coalition partners is essential to enhance overall effectiveness and deter potential adversaries in MDOE. Thus, continuous security and reconnaissance across all domains and the ability to operate in densely populated, complex terrain is needed to support long-range cross-domain capabilities with combat operations, shape operations operational and strategic levels (States et al., 2016).

MDOE recognizes that modern conflicts are often complex and multi-dimensional. It emphasizes the need for military forces to operate jointly, integrate capabilities, maintain information dominance, and adapt to rapidly changing situations across various domains to achieve strategic objectives and maintain national security. However, integration between domains can only be fully implemented when each domain is ready and can improve operability capabilities along with other domains. The land domain was one of the domains that contributed to effectiveness of operability in multi-domain environment. Thus, the readiness and challenges in the land domain, particularly in the context of military operations and synchronization are critical factor for national security, infrastructure development, and environmental sustainability. Thus, this paper will discuss the readiness and challenges associated with the land domain, particularly in the context of military operations.

LAND DOMAIN

In its history, Malaysia's land forces have responded to a wide variety of tasks from humanitarian assistance and disaster relief, to peacekeeping and, ultimately, to fight operations. To equip the land forces and meet these challenges into the future, new investments are being made in weapons, watercraft, helicopters, information effects, logistics resilience and emerging robotics and autonomous systems. The land domain, encompassing territorial control and ground forces, remains a crucial component of modern warfare. Yet, in the land domain, these functions must support the ground manoeuvre units and

other frontline combat elements. Achieving readiness in this domain is essential for national defence and military effectiveness. However, it is not without its challenges. The readiness and challenges of the land domain in a MDOE are topics of critical importance in modern military operations. In this type of environment, land forces must be prepared to operate effectively and significant challenges in conjunction with other domains such as air, sea, space, and cyberspace. This integration requires readiness across multiple dimensions.

PRESENT AND FUTURE READINESS FOR LAND DOMAIN

The readiness of the land domain, pertains to the preparedness, capability, and operational effectiveness of a nation's ground forces. Land domain in present and future is an enduring Army priority and also a critical aspect of national defence and security. It encompasses a range of factors in which operational and tactical level is one such mechanism that contribute to readiness in MDO. Army must have strategic objectives in any given operational environment and it is how Army becomes future ready. Strategic readiness focuses on necessary mechanisms for future challenges, including the ability to modernize, national power, geography, industrial capacity, political economy and demographic. Army must be able to conduct MDO in support of the Malaysian Armed Force's joint warfighting concept. It involves assessing and addressing various factors that impact the ability of land forces to achieve strategic goals in diverse and dynamic environments. This includes both conventional warfare scenarios as well as the ability to adapt to unconventional threats, such as hybrid warfare or asymmetrical tactics.

Army has a long history of achieving tactical readiness with great success. The efficacy of the Army's present and future readiness has been demonstrated by recent deployments in support humanitarian mission to Turkey to aid quake victims and the government's response to the COVID-19 pandemic in 2020 until 2022. The Army's emphasis on deployable units of action which range from individuals and small teams to formation level reactions to cope in any situation. It is a reflection of its readiness and the effectiveness of its training system, which places a strong emphasis on tactical leadership, effective command and control, and individual and collective skills. Thaba & Mtsweni (2018) found that a military capability consists of the system elements namely personnel, organization, support, training, equipment, doctrine, facilities, intelligence, and technology. All of these elements should be incorporated to guarantee the readiness of land forces to carry their mission in MDO environments. But, Martin et al. (2021) conclude that military effectiveness comprises of concept,

doctrine, training effectiveness and technological levels. While each of these puts demands on other dimensions to ensure readiness in land domain operations, this paper will discuss three main requirements to enhance capability and effectiveness of land domain in MDOE.

❖ ORGANISATIONAL

Armies must quickly adapt and changed their preferred organisational structures that will work in their current fight. At the organisational level, the effective integration and land forces strike capabilities in high-intensity warfighting scenarios will require the creation of multi-domain field formations which integrate strategic readiness. Thus, requires a robust logistics and sustainment system to ensure that land forces have the necessary supplies, equipment, and support to operate effectively over extended periods, including in expeditionary operations (Martin et al., 2021). Land forces must possess the necessary capabilities and resources to carry out their missions. This includes having a well-trained and equipped force, as well as access to the required logistics and sustainment capabilities to support operations.

Developing a clear and comprehensive strategic plan is foundational to organisational for strategic readiness. This plan outlines the nation's long-term military objectives, priorities, and the role of Army in achieving those objectives (Clas, 2020). According to Martin et al.(2021), the nation's force structure must to be in line with its strategic objectives. Land forces should be structured and organized to handle the demands of the operational environment. This entails figuring out the right force size including the type and quantity of units, equipment, and personnel in addition to setting up command and control systems that promote a well-structured organisation, efficient cooperation and decision-making. Force structure should be aligned with national security priorities and the ability to respond rapidly to contingencies event.

Recognizing possible hazards and obstacles is crucial in order to enhance the operational capabilities of the land forces. Conducting a comprehensive strategic assessment and planning threat assessment are necessary for organisational readiness in order to recognize new threats and modify strategies appropriately for understanding the environment and identifying potential risks and opportunities. Strategic readiness in the land domain is a dynamic and ongoing process that

requires continual assessment and adaptation. It involves a combination of long-term planning, resource allocation, training, and response capabilities to ensure that a nation's land forces are prepared to address a wide range of strategic challenges and fulfil their mission in support of national security objectives. This assessment informs the development of strategic plans, which outline the objectives, priorities, and resources required to achieve strategic goals in the land domain (States et al., 2016).

Organisation should also focused on strategic mobility, communication and coordination to achieved its strategic plans. Strategic mobility involved the ability of the organisation to rapidly deploy land forces to different regions or theatres of operation using its transportation assets, such as ground transport, airlift and sealift capabilities. Along with that, maintaining a robust strategic communication strategy is crucial for both domestic and international interaction when effective communication can shape perceptions and support for military operations (Tai-Ting & Ming-Te, 2012). Both mobility and communication needs an effective coordination with civilian authorities, government agencies, and non-governmental organizations, particularly in complex operations that involve humanitarian assistance or disaster relief.

❖ DOCTRINAL AND TRAINING

The Armed Forces doctrine is its fundamental strength. The best Army in the world was developed as a result of the application of this doctrine, and reform will undoubtedly encounter resistance and criticism (Rarracks, 2002). It is crucial to keep in mind that change disrupts organizations. Nonetheless, in order for organizations to remain effective, they must adapt to the new environment. The institutional knowledge is captured in its doctrine where the collective thinking of how it will train, fight, modernize, and equip itself. Training the forces started when the country was colonized by the colonist long ago, it altered how the Army trained and prepared for combat and it was the first step in the Army's transition. Over a long period of time, this capstone concept defined the tenets and the training program. Much of the present capstone training doctrine remains relevant and will do so for the duration of the ongoing transition effort. A well-developed doctrine guides of land forces in executing their missions and offers a standard framework for comprehending and carrying out land operations while

accounting for the unique features of the operational environment. This element can be likened to governance including regulations, operating procedures, policies and strategies that must be in place to affect the Armed Forces capability in a complex environment.

The element should be reinforced by training programs that supported the doctrine in which guarantee the land forces with the essential abilities and strategies. Land forces need to participate in strategic level exercises and training to make sure they are equipped to handle a wide range of situations. The capacity and capability of land forces and enforcement agencies were improved through enhancement of training programmes as well as upgrading of facilities and equipment (12th Malaysian Plan, 2021). This involves participation in multinational exercises and conducting large scale joint exercises with other services and foreign allies. Effective coalition and joint operations rely upon establishing interoperability and integration with these institutions. This includes coordinating actions with other domains, exchanging information and intelligence, and setting up shared communication networks. The system needs to be able to integrate and analyze data in many forms and from multiple sources, given the level of interoperability needed to operationalize MDO and would enable the collaboration of various systems from various services (Bowers, 2022). Additionally, land forces must be able to effectively communicate and coordinate with forces from other domains. This requires interoperability among different military branches and nations, as well as an understanding of each domain's capabilities and limitations. Information sharing and joint planning are crucial for successful multi-domain operations.

At the doctrinal level, MDO require a mission command doctrine emphasising decentralised decision-making and decentralised preapproved execution of integrated strikes. Building and maintaining strong partnerships and alliances with other nations and organizations is critical for achieving readiness in MDOE. Cooperation and collaboration can enhance collective security, information sharing, burden-sharing, and interoperability. The land domain often operates in conjunction with other branches of the military and international partners. Thus, personnel readiness is an essential element for interoperability and cooperation between land forces and other military elements for strategic readiness (Parameswaran, 2014) and it is a dynamic process that requires constant attention and

investment. Furthermore, it ensures that military personnel are prepared to face the challenges of their duties and mission effectively while ensuring that military personnel are well-trained, physically and mentally fit, motivated, and ready to perform their duties effectively (Pendleton, 2019). Soldiers receive basic training when they join the military and ongoing comprehensive training and education to enhance their skills and knowledge in the areas of weapons proficiency, tactics, communication, medical skills, and leadership.

Apart from that, ensuring the mental health and resilience of military personnel is vital. Mental health programs, counseling services, and resources are made available to address the psychological well-being of soldiers, particularly in high-stress operational environments. Adequate living conditions, access to quality meals, and support for soldiers' families contribute to overall morale and welfare. Soldiers who are content are more likely to be ready and motivated in order to maintaining high morale. Ensuring that deployments and rotations are managed effectively is critical. Soldiers need time to rest, recover, and spend time with their families between deployments to maintain long-term personnel readiness. In today's diverse societies, ensuring that the military is inclusive and respectful of various cultures and backgrounds is essential. This is not only important for personnel morale but also for operational effectiveness. Military personnel must be adaptable and willing to learn continuously. They should be able to respond to evolving threats and technologies. This can be organized into a workable technique that yields a workable analysis, like: 1) publish a doctrine that gives the organization a boost and clarifies its training procedures, 2) develop a training capstone doctrine that will last into the objective force and be applicable to both present and future operating circumstances, and 3) providing the Army's (active/reserved component) final training guidelines to facilitate the continuous transition. In the end, the theory needs to hold. It must function as a means of energizing training through transformation and into the objective force.

The organization gives leaders and soldiers training experiences in addition to teaching Army doctrine. It prepares them for careers as effective members of lethal units and battle staffs that coordinate combined arms, joint, and multinational operations and sort crucial information in an environment rich in information. They also learn how to be creative and innovative problem solvers who can adapt to uncertainty. Training for

everyday activities and a small number of essential responsibilities relevant to the occupation is provided by institutions. Because of current doctrine, all levels of soldiers and leaders are better now. A training concept that is defined by criteria, enabling commanders to see and declare inadequate training for what it is, has improved the Army's institutional honesty. Systems that accurately represent the realities of a wide range of missions are necessary for the development of new doctrine and training.

❖ TECHNOLOGY AND INNOVATION

Regular modernization and the incorporation of advanced technologies into land forces are vital for maintaining strategic readiness. This includes leveraging emerging technologies, such as unmanned systems, robotics, artificial intelligence (AI), and enhanced communication systems, to enhance capabilities and gain a competitive edge in the land domain. In doing so, upgrading equipment, integrating digital systems, and keeping pace with emerging military technologies is the key for maintaining strategic readiness (Garn, 2019). Despite the fact that technology has continuously impacted operations, historians can consider this era to be the turning point in how technology started to alter modern organisation and processes fundamental characteristics. If this is the case, it is because our human-centric organizations have become socio-technical due to the emergence of non-human entities. Socio-technical organizations feature the allocation of significant tasks and decision rights to non-human entities. Due to the widespread availability of near-ubiquitous connectivity, big data, on demand data processing, artificial intelligence, and machine learning, our operations will use more and more robots, autonomous systems, mixed human-agent teams, real and virtual entities (software agents), and robots to make decisions (Alberts, 2018).

We can use as many effective capabilities as we can, including non-military ones, by integrating both technology and innovation. This will enable us to use combinations that the enemy is unprepared for or unable to counter. In order to achieve our stated goals, we must instill an innate desire to examine every area and step in when necessary (UK MoD, 2020). More military operations could be possible due to emerging technology and innovation and these technologies have the power to lessen the danger that human operators face

while also enhancing situational awareness and accelerating reaction times and agility. With the goal of gaining a decisional edge over an adversary, the MDO method will be significantly aided by the use of the new technologies. AI platforms, unmanned and autonomous systems, improved passive sensors, more compact weaponry, and electronic and cyberwarfare capabilities that support decision-making could make an opponent more difficult to defeat and open the door for focused attacks on important targets. As a result, the choice will be the center of any potential strategic paradigm that emerges for the planning and execution of future operations in land domain (Ionita, 2022).

CHALLENGES

Future conflicts will involve a variety of threats, including symmetric, asymmetric, and hybrid ones. Therefore, it is imperative to integrate military and non-military tactics in an effective manner in order to gain influence. Most competing efforts are anticipated to be made through and across multiple domains, both offensively and defensively. Thus, developing cross-domain command capability is essential (Vasicek & Hlavizna, 2021). However, there are also challenges to be addressed in the land domain within a MDOE. One major challenge is the need for synchronization and coordination between different domains. This requires effective command and control structures, as well as the ability to share situational awareness and intelligence across domains. The operating environment's growing complexity presents another difficulty. Land forces must be ready for a wide range of scenarios because MDO encompass a wide range of potential threats and mission sets. Flexibility, adaptation, and the capacity to act quickly in the face of changing conditions are necessary for this.

Integration and coordinating land operations with activities in other domains can be challenging due to differences in capabilities, communication systems, and command structures. Overcoming these challenges requires robust joint planning and interoperable technologies. MDO operations on land introduce a level of complexity that demands meticulous planning and execution. Coordinating actions across domains while accounting for different terrains, weather conditions, and enemy capabilities can be exceptionally challenging. However, adapting to rapidly evolving technological advancements and changing threat landscapes poses a constant challenge. The

ability to stay ahead of adversaries in terms of technology and tactics is essential for maintaining readiness. The tasks of decision-making authority, and a certain amount of autonomy is given and conducted by non-human entities due to the special dynamics and nature of activities.

While the application of AI and machine learning can expedite processes and enhance decision-making, it can also give rise to questions about accountability, transparency, and bias (Manolache, 2023). Unmanned systems, like drones and robots, can be used to gather intelligence, conduct surveillance, and carry out precision strikes. However, they can also present ethical and legal difficulties, like the possibility of civilian casualties and the need to account for the autonomy of acts. Nevertheless, with technology they present new difficulties, such as the requirement for fresh training programs and philosophies to guarantee successful integration. Moreover, the land domain faces challenges in managing information and maintaining cybersecurity in a MDO environment. The reliance on information networks and the interconnectedness of different domains present vulnerabilities and potential risks that must be mitigated.

It's important to comprehend the command and control (C2) effects of these delegations. The cognitive abilities, expertise, and experience that these newest recruits and technology bring to the fight are still mostly unknown to us. Questions about their dependability, risk tolerance, and trustworthiness need to be addressed and taken into consideration in C2 calculations, just as they do currently for human team members. What kinds of tasks can they perform better? Non-human entities, for instance, are less likely to suffer from information overload or cognitive and psychological obstacles to overturning prior decisions in favour of one that is better suited for the current circumstance. However, because intelligent objects move at a speed that is unnaturally quick, humans will have a hard time understanding and believing the advice or acts of their non-human team members. Information gathering and analysis on a previously unthinkable scale are necessary for 21st century MDO. Hence, future endeavours that are more comprehensive could potentially address the issues of synchronization and coordination between different domains, and their accountability.

CONCLUSION

In conclusion, the readiness and challenges of the land domain in a MDOE require a comprehensive approach. This involves ensuring readiness in organisation, doctrine, equipment, and interoperability, as well as leveraging emerging technologies and investing in training and education. Additionally, addressing challenges such as synchronization, complexity, cyber vulnerabilities, interoperability issues, resource allocation, and adaptability must be carefully considered for effective land operations in a multi-domain environment. The view that each of the five dimensions/domains such as land, sea, air, space and information should not be viewed as compartmentalized elements. The battlespace needs to be seen as an integrated whole, and operations carried out on multiple fronts, as a continuum of interrelated activities. Military forces that successfully overcome these challenges will be better prepared to operate effectively in the multi-domain environment, enhancing national security and defense capabilities.

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MULTI-DOMAIN OPERATING ENVIRONMENT - HUMAN RESOURCES READINESS AND CHALLENGES

By LT KOL MOHD NASIRUDDIN BIN ISMAIL
ROYAL RANGER REGIMENT

"*Saya mengarahkan semua Panglima Formasi untuk memberikan penumpuan secara khusus, konsisten dan tertumpu dalam membangun serta memperkukuhkan modal insan elemen kemanusiaan. Usaha pemerkasaan sumber manusia ini dapat dicapai dengan mempertingkatkan paras kecekapan, keberkesanan dan kesiapsiagaan yang sejajar dengan fungsi, peranan serta tanggungjawab yang telah ditetapkan.*" – **Jeneral Tan Sri Dato' Muhammad Hafizuddeain bin Jantan.**

INTRODUCTION

Based on the above, the Malaysian Chief of Army has stated that the aspirations implemented by his high command are the result of efforts based on three main objectives, namely readiness, organizational sustainability and the personality of the personnel, which is strengthened by a purposeful, planned and comprehensive partnership based on the 3M Synergy Concept (Man, Machine and Method). In addition, it is also used as a guide or focus for the continuation of the initiative within the framework of the Capability Development Plan (Army 4nextG). This plan has highlighted the need for comprehensive human resource management to achieve Malaysian's Army goals and direction and to produce professional, credible and competitive human resources for a future full of challenges and competition.

Human resources are the basis of the strength of an army organization, which should be emphasized because it is dynamic and competitive. With the current development trend, the Army 4nextG plan must be refined and carefully managed and comprehensively regulated so that the planned capability and readiness can be achieved by the ultimate goal of 2050. To form a credible and competitive force, the Malaysian Army needs forces that are better prepared to fully face any war situation, regardless of where they are located. From the perspective of the current development, which is increasingly positive, the management of human resources in the Malaysian Army should also be further developed by taking into account the moral, cognitive and physical aspects that must be in line with the main objectives of the Malaysian Army and also the current situation.

In determining the main objective to be achieved, it is important to emphasize the selection of Malaysian Army personnel who must meet the criteria and requirements. Therefore, the focus on readiness and human resource development in the Malaysian Army organization must be parallel and balanced to operate in a multi-domain environment.

HUMAN RESOURCE READINESS MANAGEMENT

Human resource administration is routinely implemented by the Malaysian Army. The four primary pillars of this implementation are planning, retention, development, and recruitment. The primary goals of the Malaysian Army's human resource management concept are to recruit and select qualified military personnel, plan for the needs of the army's human resources, develop human resources in accordance with those needs, and retain human resources within the TD organization. The Malaysian Army's goals and objectives can be achieved in part by implementing the very successful and crucial idea of human resource management.

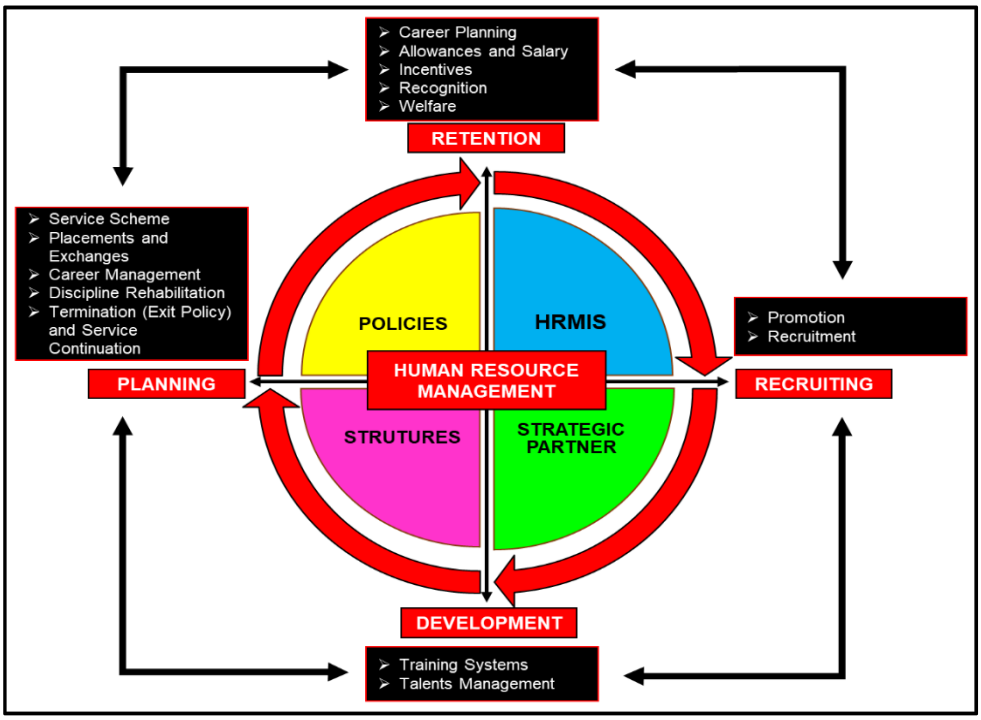

Figure 1: The Concept of Human Resource Management in Malaysian Army

The aforementioned diagram makes evident the four key components that underpin the Malaysian Army's human resource management policies and procedures. To guarantee that the ideas used in the service are successfully executed in accordance with the current and existing policy, Army 4nextG, and HRMIS system, all these components are also interconnected.

❖ **Recruitment of Human Resources in the Malaysian Army**. The fundamental component of the Malaysian Army's human resource management strategy is recruitment. It is difficult to find enough human resources to fill the ranks of the Malaysian Army of the future because these troops must receive the training necessary to become competent soldiers for the advancement of future generations. This procedure is done with great care and attention to detail in order to meet the requirements of the Malaysian Army and contribute to the attainment of the Army 4nextG objectives. In order for the Malaysian Army to successfully generate thinking soldiers, the current procedure for selecting human resources needs to be improved. This will allow the army to receive personnel that are more professional, versatile, efficient, and multi-skilled. When selecting human resources, the primary factors that should be considered are educational background, health, physical, religious basis, morals and skills.

- **Recruitment**. Based on the Malaysian Education Development Plan 2015 - 2025, the government is always committed to improving the education level of the youth in the future in order to be able to compete in the global market. The graduate's employability in 2022 is depicted in the figure below. The number of graduates from both public and private universities is rising, according to data from 2018. Given the growth noted, it is possible that in the future a bachelor's degree will be required as the minimum academic requirement for soldier admission. While adhering to the current policy when it comes to officer recruitment. It is fair to consider that the primary criterion for selecting soldiers of the Malaysian Armed Forces is academic qualification in order to meet future needs.

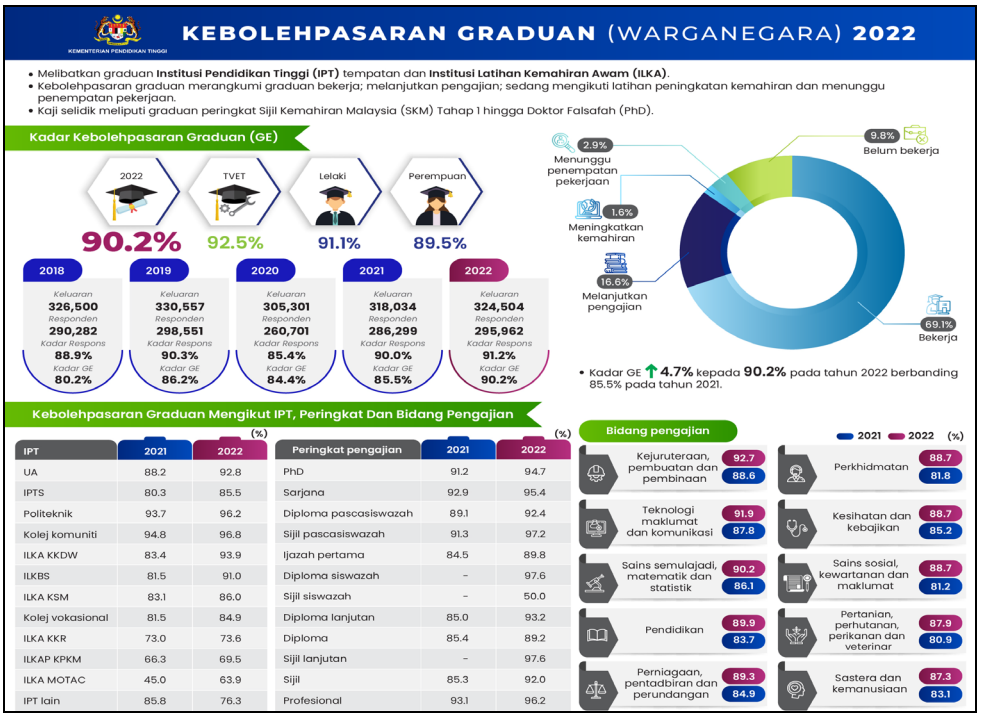

Figure 2: Graduates Employability (GE) 2022

- **Promotion and Advertisement**. Young people are drawn to the military by promotions, which are highly significant. A specific work field's relevance and benefits will be communicated to the general public through promotional tactics. According to Ramsey (1994), Ahmad, and Schroeder (2002) recruitment strategy should aim to increase the number of qualified applicants for a position, address social needs involving demographic quotas, and lower selection costs by using promotional methods to draw in as many qualified candidates as possible in order to implement effective employee selection.

  Promotion is done in a number of ways, depending on how well it can reach the target audience for a particular location, such as through print, electronic, and web releases. Furthermore, career speeches and exhibitions are thought to be efficient means of informing the general audience. By using the chance to broaden its scope to include all schools and higher education institutions, this issue also has to be improved. In order to support future promotional efforts and the hiring of human resources, MAF should also maintain constant

communication with other government agencies, representatives of the people, non-governmental organizations, and diverse associations.

❖ **Human Resource Development**. Maintaining the usage of human resource management in the Malaysian Army is a difficult and demanding work that must be undertaken. This issue is assessed using a number of invisible criteria, including attitudes, life values, aspirations, motives, perceptions, psychology, and life objectives. Human resource management is an activity carried out in a business or service-oriented organization with the goal of ensuring that the organization's human resources can provide a decent and commensurate return and make a significant contribution, according to Maimunah (1994). However, according to Goodale and Hall (1998), human resource management is the process of uniting individuals and groups within an organization in order to accomplish goals by integrating the environment, the organization, the task, and the individual. Human resource development has been prioritized in order to increase readiness by the Malaysian Army, which takes this seriously. Training System, Academic Improvement, Performance Evaluation, and Leadership Management are the four components of human resource development that are executed based on Army 4nextG. These parts require attention in order to strengthen the Malaysian Army's human resource development going forward.

- **Training System**. Training is an alternative or effort in producing efficient, knowledgeable and skilled military personnel. To ensure the success of a training program, the group responsible for designing the program and managing the training function is a knowledgeable and trained group in the field of training and human resource development. In addition, the syllabus developed should have a comprehensive program design and be compatible with the trainer's skills and the ability of teaching aids.

Training is an important element in ensuring that every member of the military has the skills, abilities and knowledge that can help them improve their work performance and be able to perform current or future tasks. Effective training can provide many advantages to members in improving their efficiency and skills.

The Kolb Model is thought to be a more suitable and thorough model to serve as a guide in order to achieve these needs. This model describes training as a teaching and learning process to acquire knowledge, skills, experience, and other things that are needed in the workplace. Here are the four tiers that make up this model:

a. Identify the requirements and characteristics required in the training program.

b. Collect data and make observations of the necessary skills.

c. Integrate all the desired things with real application.

d. Create a conceptual foundation for the necessary training program.

- **Talent Management**. In order to attract and retain the best talent in the Malaysian Armed Forces, strategic sponsorship needs to be planned to ensure the continuity of human capital development through prestigious sponsorship without marginalizing the socially disadvantaged. It is imperative for the Malaysian Army to have backups with the authority, skill, and qualities of a leader. To ascertain the human resources acquired, the Malaysian Army must identify officers and other ranks that possess the capacity to ascend to the levels that ought to be identified from the start, enabling career development for them to be carried out in a more organized fashion. Under the supervision of their individual Career Managers, the officers and LLPs can be categorized under the Fast Track Group.

❖ **Human Resource Planning**. In order to ensure that present demands are met, human resource planning involves estimating the quantity and kind of human resources that the organization will require in the future. The following are a few of the goals that have been defined to guarantee the success of this human resource planning included estimating the workforce and identifying the kinds of skills required to ensure future operations (work demand forecasting), contrasting the availability and demand for human resources across enterprises

for both present and future, creating and putting into practice human resource planning to ensure continuity and innovation in response to service requirements and analyze the strategies that have been put into action to ascertain their efficacy.

In terms of human resource planning, the Malaysian Army has also employed a number of methods. In order to identify how human resource planning should be enhanced and managed effectively in light of the present and future circumstances, the following methods are being used or have been implemented:

- **Service Scheme**. It is necessary to analyze and enhance the current service plans. For instance, officers may receive time-based promotions and other ranks may receive technical allowances if their skills are deemed suitable for their present and future responsibilities.

- **Placements and Exchanges**. Through the implementation of a planned work rotation system and the establishment of a relevant duration for holding a post for at least two to four years, this approach seeks to guarantee that the Malaysian Army's human resources has a diversity of experience.

- **Career Management**. Career management in the future should be more transparent and systematic. The career plan of each officer and soldiers will be determined individually based on their achievements and qualifications. The Army's HRMIS system will make all of this data accessible through online.

- **Discipline Rehabilitation**. To prevent trained human resources from committing disciplinary offenses while in the service, the Malaysian Army must set up a program and provide a disciplinary recovery mechanism. Religious and counselling programs must be integrated and carried out consistently, and each performance improvement must be systematically documented.

- **Termination (Exit Policy) and Service Continuation**. This strategy aims to facilitate the process of service termination in the interest of the service if the supervision or counselling action is not successful. In addition, to minimize the protective culture by ensuring

proactive actions are taken against officers and other ranks who are underperforming at the initial stage.

❖ **Retention of Human Resources**. Retention is crucial to balancing the organization's present and future demands. This issue must be resolved in order to guarantee that there are always enough human resources available to meet service requirements. The Malaysian Army's human resources must receive enough current training that is in accordance with current needs and technological advancements in order to guarantee that they are constantly prepared to complete the tasks assigned to them. Additionally, retention must be implemented successfully in order to ensure that human resources are distributed appropriately based on expertise, that military personnel's welfare is always taken care of, that their performance is continuously monitored, and that each military personnel's motivation is always at its highest level at all times.

Following are a numbers of action plans that can be used as a reference and, in accordance with Army 4nextG requirements, executed in the future to implement the retention of human resources in the Malaysian Army's service:

- **Career Planning**. The Malaysian Army must implement and plan all human resource career plans in order to retain its skilled personnel and prevent them from leaving the service earlier than necessary because human resource management was unable to ensure their continued employment. Because it pertains to the morality and welfare of employees, this issue must be given special attention. In order to manage promotions, career courses, awards, and recognition, transparency is also required. To guarantee that officers and soldiers will stick around and be very motivated at some point, all of these factors must be applied equally.

- **Allowances and Salary**. Three elements typically make up the salary and allowance structure: bonuses, results-oriented pay, and time-based pay. Every system has pros and cons of its own. The Malaysian Government has established the salary and allowance rates for the Malaysian Army, which are UGAT-coordinated. While allowances are given in accordance with each employee's predetermined competence and skills, salaries are determined by the level they already have.

- **Incentives**. Payments that are oriented toward the future, connected to particular goals and plans, and centered on the contributions of organization soldiers are known as incentives. In reality, the purpose of incentives is to inspire employees to meet the goals they have set for themselves in order to promote good performance and goal achievement. MAF has put in place a number of incentives for its soldiers, including home purchase incentive programs and educational scholarships for the children of soldiers who achieve academic excellence.

- **Recognition**. Recognition to soldiers is essentially a form of recognition for the quality of work shown by the staff because quality employees are the main asset of an organization. This strategy is seen to be effective and aims to appreciate, recognize and motivate Army personnel who have made outstanding contributions to the service.

- **Military Welfare**. Welfare towards military personnel involves all forms of benefits and social services provided by the service. Employment welfare is defined as benefits and services for employees in addition to the basic remuneration received. However, the welfare of work received by individuals depends on the type of work, place of work, the leader's commitment in providing services and social benefits to workers and mobilization. Employment welfare is also a strategy to maintain and increase military loyalty to the service. As a result, every administration must always appropriately consider issues pertaining to welfare and be attentive to listen to all the difficulties encountered by troops of the unit.

CHALLENGES

The challenges of warfare in a dynamic and ever-changing Multi-Domain Operational Environment characterized by a multitude of internal and external factors have proven to be one of the greatest challenges in the development of human resources. There is a need to strengthen the Malaysian Army's human resources through a planned action plan to improve the Malaysian Army's human resources in line with its development. The challenges identified include the following:

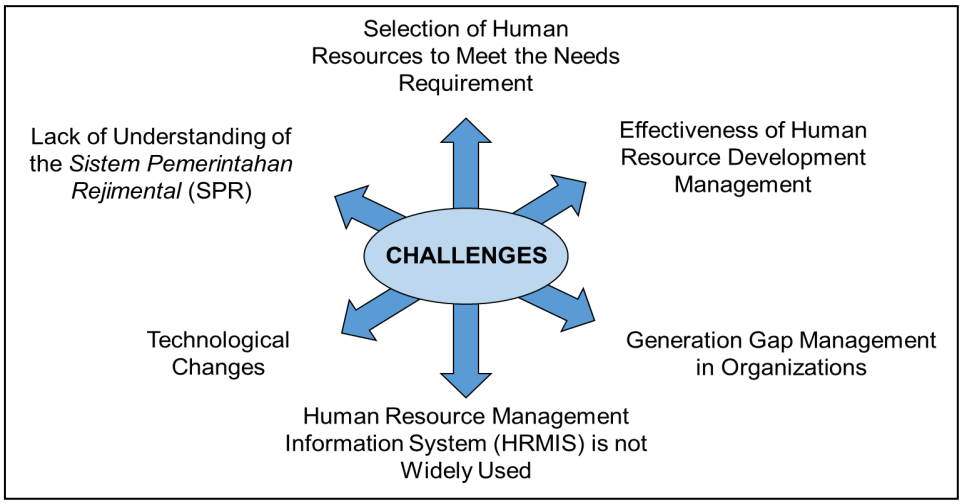

Figure 3: The Malaysian Army's Human Resource Challenges

❖ **Selection of Human Resources to Meet the Needs Requirement of the Malaysian Army**. The progressive and dynamic selection of human resources to attract suitable candidates for officers and other ranks according to the qualifications and requirements of the Malaysian Armed Forces is a challenge that requires attention due to future competition with other public and private organizations in the selection of human resources. In order to satisfy the needs of the service in the future and ensure that human resources are produced in a dynamic and effective manner, Malaysian Army personnel must also possess academic qualifications that are on par with those of other public organizations.

❖ **The Effectiveness of Human Resource Development Management**. The ever-changing operational landscape and increasingly demanding tasks ensure that Malaysian Army soldiers remain skilled, dedicated, and future-relevant. To ensure that every member of the Malaysian Army possesses the mentality, spirit, and military character necessary for their job as well as the abilities, knowledge, and attitudes demanded by the Malaysian Army's organization, quality human resource development management, emphasis on innovative training concepts, and future academic improvement opportunities must be attended to. This challenge must be addressed to achieve the goal of becoming a credible Malaysian Army and having soldiers with high morale and competitiveness in line with the

current needs of the Malaysian Army to compete in Multi-Domain Operating Environment.

❖ **Generation Gap Management in Organizations**. Managing human resources to prepare a comprehensive fighting force also requires an understanding of the generation gap that exists in the Malaysian Army. The generation gap gives meaning to the existence of differences in attitudes, values, and behaviours between generations in various aspects of life due to age differences. Indirectly, this difference makes the human resource management system less stereotyped.

❖ **The Human Resource Management Information System (HRMIS) is Not Widely Used**. The level of awareness about the use of this system remains low in the government and organizations. Optimizing the use of this system in the process of accessing, storing, analyzing, and managing information for the use of human resource planning needs to be emphasized in order to be more efficient and effective because the future work environment will be more difficult with the full use of technology in the management and operating concepts of organizations.

❖ **Technological Changes**. The implementation of new technologies necessitates the addition of more experienced personnel who can assist management in the identification and resolution of issues and the rapid decision-making process in respect of work areas. Modern technology, both in the present and the future, enables human resource management to be more efficient while simultaneously accelerating the progress of different human resource functions.

❖ **Lack of Understanding of the *Sistem Pemerintahan Rejimental* (SPR)**. SPR is a method to determine the effectiveness and efficiency of dynamic human capital production that requires sacrifices to serve the military, protect the dignity of the force and determine success in all assigned missions. Therefore, efforts must be made at all management levels to ensure that SPR is used as a work culture practice in the future.

HUMAN RESOURCES HIRING STRATEGY ALIGNED WITH THE ARMY 4NEXTG INITIATIVE

The human resources department will develop a hiring plan that supports the goals and vision outlined in the Army 4nextG strategic plan. As the Army modernizes for the future, human resources will ensure the workforce has the right skills, knowledge, and abilities to execute the Army 4nextG mission. This will involve recruiting and retaining talent aligned with next-generation capabilities, evolving training programs, and cultivating an agile culture ready for transformation. The employment strategy will focus on building a diverse, inclusive, and empowered team equipped to drive innovation. By aligning hiring and workforce development with Army 4nextG, human resources will enable the Army to successfully transition to the force of the future.

According to the current allocation, which concluded on October 31, the Malaysian Army is filling 76.2% of its posts, with a total number of filling posts of just 80,588 compared to the actual manning of 105,758 posts. 7,219 officers and 81,405 other ranks were filled from that total.

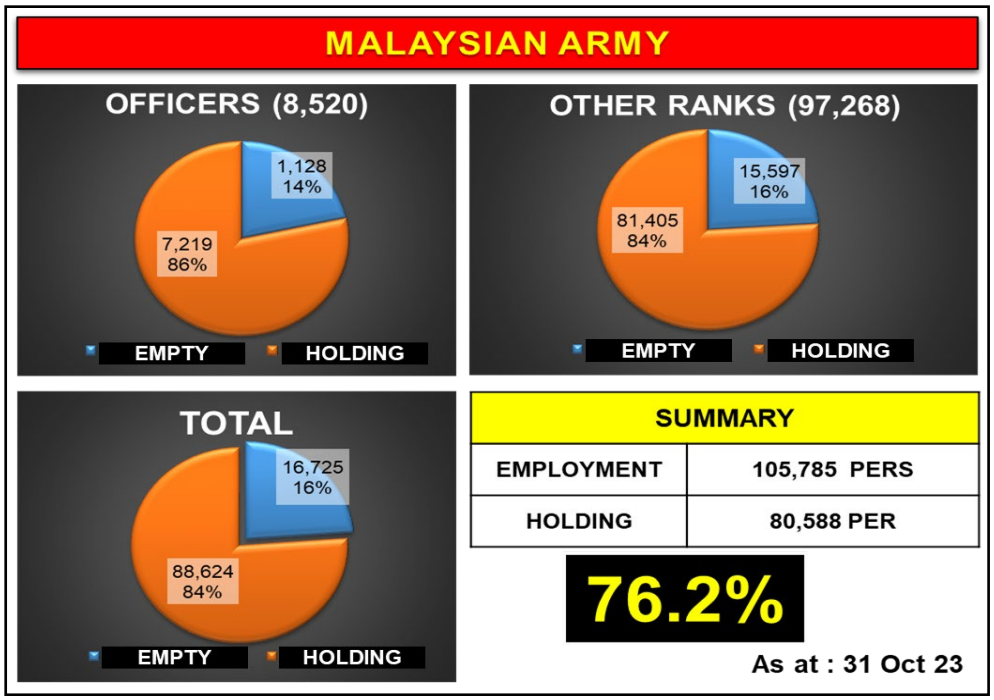

Figure 4: Total Malaysian Army Employment as at 30 Oct 23

❖ **Human Resource Requirements to Support the Army 4nextG Plan**. Human resources is one of the five primary programs for implementing the Army 4nextG Plan and achieving the Malaysian Army's goals and objectives. Recognizing current and future needs, professional, credible and competitive human resources are essential in facing today's challenges and competition. One of the main objectives of this program is to implement staffing to meet the needs of human resources.

The human resource planning process must be executed on a continual basis and must be in line with the Malaysian Army's aims. If the requirement for human resources is to be met, the military's strength must be expanded as well. If the organization wishes to explore into new domains and innovate, new military people may need to be recruited, or existing military personnel may be provided enough training to guarantee that the Malaysian Army's use of human resources is more successful in achieving its goals.

❖ **Forecasting The Demands and Needs of Military Personnel**. The Human Resources Branch must assess future military recruitment requirements for the organization and produce projections based on strategic planning and organizational goals. Forecasting the demands of these military personnel may be accomplished using two approaches: qualitative and quantitative:

- **Qualitative Approach**. Using this strategy, anticipating the demands of military personnel should be created by each department based on objectives and instructions and transmitted to Higher Commander. Delphi, nominal, and approximation approaches are all viable options. All forecasts are based on staffing schedules, military personnel skill inventories and employee turnover charts.

- **Quantitative Approach**. The analysis must be based on the pattern of military personnel requirements over the last several years or on an analysis of the ratio of expertise to military people. Predictions are made based on prior patterns or military troop deployments. Forecasting human resource supply is done to determine whether the quantity of military personnel available in the organization is sufficient to meet the organization's goals or not. Military manpower may be obtained from two

sources: internal sources made up of current forces and external sources made up of new recruits.

❖ **Analyzing the Demand Gap and Military Recruitment**. Based on the analysis of demand forecasts and the recruitment of military personnel, comparisons can be made and gaps will be identified. If the gap is positive, this means that the demand for military personnel exceeds the input supply. If the gap is negative, it signifies that the demand for military personnel is lower than the supply of military personnel, resulting in a labour surplus. So, the implementation of this analysis is important to know the actual demand of military personnel for service.

❖ **Forming an Action Plan to Close the Gap**. Based on the gap, the organization must adopt an appropriate action to bridge or close the gap. If the gap is positive, efforts should be made to expand the number of military troops by recruiting workers. If the gap is negative, then actions to reduce the number of military personnel must be adopted, including layoffs (according to existing policies), job sharing and limiting recruitment.

❖ **Make an Evaluation of the Action Plan**. Every action plan implemented needs to be re-evaluated to see its effectiveness when put into practice. If the plan cannot meet the organization's goals or still does not close the gap, then corrective action needs to be taken. This matter needs to be implemented repeatedly so that all existing gaps can be purified by producing neat and effective actions.

❖ **Implementation of Positions**. In general, the Army has a number of posts known as implementation positions, which are from all units and formations that have been dissolved or disbanded but the position has not been entirely turned over. All of these positions are governed by the Army's Planning and Development Branch, which serves as the custodian of all Malaysian Army positions. In order to meet the current needs and demands for staffing, its can be implemented by using this staffing resource but only temporarily. Next, new employment applications must be submitted to the Public Service Department (JPA) to preserve the needs of the organization.

CONCLUSION

The importance of human resources in the Army's development process cannot be overstated. Human resources in the Army not only contribute to the organization's productivity, but they may also enhance the balance of national security. As a result, the primary task of human resource management is to develop a human resource management system that is futuristic and dynamic in order to deal with present and future environmental changes.

The human resource management system must consider all areas of human requirements. To ensure the efficiency and efficacy of services, human resources must not only continually increase their intellectual capacity (skills and knowledge) in line with current advancements, but also equip themselves with emotional and physical health ability. While the current service system should also support and prioritize these demands. All existing and future obstacles should not be handled lightly in order for the organization to survive in the future.

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MULTI-DOMAIN OPERATING ENVIRONMENT – HUMAN RESOURCE READINESS AND CHALLENGES

By LT KOL NAZIRUDDIN BIN ISMAIL
GENERAL SERVICE CORPS (PAY)

"If you want to build a ship, don't drum up people together to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea." – **Antonie de Saint Exupery, a French Writer, Poet, Journalist and Pioneering Aviator.**

INTRODUCTION

A Multi-Domain Operational Environment refers to a complex and dynamic setting in which military, defense, or security operations take place across multiple domains. In this context, "domains" typically refer to different areas or mediums in which military and security forces operate. Over the past ten years, the phrase "Multi-Domain Operations" (MDO) has gained prominence as military services, particularly those of the United States, have sought to formalise their strategy for fighting outside of the conventional realms of land, sea, and air. Multi-Domain Operations (MDO) as an operational concept affect the types of weapon systems and equipment the Army procures, the types and numbers of Soldiers are required, and the administration of the Army, and the kind of training necessary – all important congressional legislative problems.

In Malaysia, each of the three Services of the Malaysian Armed Forces (MAF) has expanded in size and scope for Malaysia during the ensuing decades. Both have consistently strived to improve their ability to defend themselves by making efficient use of land, sea, and air power. In order to perform multi-domain operations, the Army, Navy, and Air Force must work together quickly and effectively. It's simpler to talk about jointness than to do it. Each military traditionally raises, trains, and maintains its own personnel. But it's obvious that single-service businesses won't be able to match modern demands. The establishment of the Malaysian Armed Forces Headquarters (MAF HQ) in 1992 marked the beginning of efforts to create a Joint Forces Command (JFC).

Eventually, in 2004, the Joint Forces Headquarters (JFHQ) was established, institutionalising the jointness idea whereby the three Services work together to accomplish tasks related to governance and operational management. All joint exercises, joint and combined operations, and international operations are under the purview of the JFHQ.

Organisations in the military are different from other kinds of organisations. Its distinctiveness derives from the organization's founding circumstances and early history. The Persians have a reputation for having a well-organized military and a high degree of discipline. The Persians' ability to rule over numerous nations in Europe, Africa, and Central Asia and to colonise the area for a thousand years is proof of this. Even across military organisations from different nations, there are some traits or qualities that are universal or similar. The administration of human resources (HR) is still crucial for the Malaysian Armed Forces. HR may also help to a nation's success with the Malaysian Armed Forces having about 120,000 personnel. Furthermore, human resources are regarded as the most important intangible asset that contributes to an organization's competency and is critical to resolving organisational challenges and improving performance.

MULTI-DOMAIN OPERATING ENVIRONMENT

A Multi-Domain Operational Environment (MDOE) recognizes that modern conflicts and security challenges often span multiple domains simultaneously. For example, a military operation may involve land forces coordinating with air support, satellite communication, and cyber warfare capabilities. This complexity necessitates a holistic and integrated approach to planning, executing, and managing operations. The concept of Multi-Domain Operations (MDO) has gained prominence in military and defense circles to address these challenges. MDO emphasizes the need for joint and cross-domain collaboration, interoperability, and synchronization of efforts across land, air, sea, space, cyber, and information domains. It involves the integration of capabilities and assets from different domains to achieve mission success and maintain a competitive advantage in modern conflicts. The concept of the Multi-Domain Operating Environment (MDOE) represents a paradigm shift in military and strategic thinking. It acknowledges the evolving nature of conflict and security challenges in the modern world, where traditional boundaries between land, sea, air, space, cyber, and information domains are increasingly blurred.

The historical roots of the multi-domain concept can be traced back to the earliest forms of warfare. Throughout history, military strategists and commanders recognized the importance of controlling multiple domains to achieve victory. Ancient civilizations, such as the Romans and the Greeks, understood the advantages of combined arms operations involving infantry, cavalry, and naval forces. In more recent history, World War II highlighted the significance of multi-domain operations. The conflict saw the integration of land, air, and sea forces on an unprecedented scale. The D-Day invasion in 1944, for instance, involved the coordination of land, air, and naval forces to launch a successful amphibious assault on Normandy.

The Cold War era brought about a new dimension to multi-domain thinking. The United States and the Soviet Union engaged in a nuclear standoff that extended to space and the potential for global cyber conflict. The concept of mutually assured destruction (MAD) demonstrated how the manipulation of multiple domains, particularly nuclear capabilities, could serve as a deterrent. During this period, space became a contested domain with the launch of Sputnik by the Soviets in 1957. Space assets became integral to communication, reconnaissance, and navigation, illustrating the importance of multi-domain capabilities beyond Earth's surface.

The 1991 Gulf War marked a significant turning point in multi-domain warfare. The U.S.-led coalition demonstrated the effectiveness of precision-guided munitions (PGMs) and advanced sensor technologies, combining air, ground, and naval forces to achieve swift victory. The success of this operation showcased the potential for integrated multi-domain operations to achieve strategic objectives with minimal collateral damage. Post-9/11 Conflicts and Asymmetric Warfare- the early 21st century witnessed a shift in warfare with the emergence of asymmetric threats, particularly in the form of non-state actors and insurgent groups. The U.S. military was forced to adapt to these evolving challenges, emphasizing counterterrorism and counterinsurgency operations. This period highlighted the importance of information warfare, cyber operations, and intelligence as critical domains.

Later on, the rapid growth of the internet and digital technologies brought cyber and information domains to the forefront. Cyberattacks, information warfare, and disinformation campaigns became potent tools for state and non-state actors alike. The Stuxnet malware attack on Iran's nuclear program in 2010 exemplified the strategic implications of cyber operations. As geopolitical dynamics shifted toward the Asia-Pacific region, the U.S. military recognized the challenge of Anti-

Access/Area Denial (A2/AD) strategies employed by potential adversaries. A2/AD seeks to deny access or control over certain geographic areas, emphasizing the need for multi-domain capabilities to overcome these challenges.

In recent years, the concept of Multi-Domain Operations (MDO) has gained prominence. MDO reflects a holistic approach to warfare, recognizing that success in the modern battlefield requires integration and synchronization across land, sea, air, space, cyber, and information domains. MDO encompasses several key principles. Such as cross-domain synergy. It emphasizes the need to exploit the complementary capabilities of each domain to create synergistic effects. For example, leveraging space-based assets to enhance situational awareness on the ground.

HUMAN RESOURCES READINESS

Within this intricate operational context, Human Resource (HR) readiness plays a pivotal role. It involves preparing the workforce to excel in a dynamic environment marked by rapid technological advancements, shifting geopolitical landscapes, and multifaceted challenges. Sun Tzu rightly stated that it is a doctrine of war not to presume the opponent will not arrive, but rather to rely on one's readiness to face him. Similarly, Clausewitz (1874) emphasised the importance of readiness when he stated that the "pattern and preparation and mode of using arms, construction of fortifications and entrenchments, organism of an army and the mechanism of its movements, the end and aim of them all was the establishment of an armed force fit for use in war." According to Betts (1995), readiness refers to the operational status of assets that are ready for use at their optimal or specified parameters. The use of assets means the immediate combat capability of the existing force rather than the capabilities of the desired size and types of force. Similarly, the US Department of Defence (2010) defined readiness as "the ability of US military forces to fight and meet the demands of national military strategy." According to Interfax [Russia and CIS Military Daily (Moscow) on 4 February 2011], Russia places equal importance on maintaining combat readiness, and an increase in officer personnel will strengthen the army's combat preparedness.

The nature of warfare has evolved significantly over the centuries, and with it, the concept of human resource readiness in the military. In the modern era, the MDOE has become the battleground of the 21st century, spanning land, sea, air, space, cyber, and information domains. Within this complex and dynamic landscape, human resource

readiness takes on newfound importance. It encompasses a holistic approach to prepare and equip military personnel for the multifaceted challenges of warfare. This essay explores the various dimensions of human resource readiness in the MDOE, highlighting its critical role in ensuring military effectiveness and success in contemporary conflicts.

- **Training and Specialization**. In the MDOE, soldiers are required to possess a high level of specialization and expertise. Unlike historical warfare, where basic combat skills sufficed, modern military personnel undergo rigorous training tailored to their specific roles within each domain. Soldiers are not just trained to fight on the ground; they are prepared for cyber warfare, space operations, information warfare, and more. This specialization enables them to excel in their domain while remaining adaptable enough to collaborate effectively across domains when necessary.

- **Technological Proficiency.** This is another cornerstone of human resource readiness in the MDOE. Soldiers are equipped with advanced technology and tools relevant to their respective domains. This includes state-of-the-art weaponry, communication systems, cyber defense tools, and space-based assets. Proficiency in using these technologies is essential not only for mission success but also for maintaining a competitive edge in modern warfare.

- **Interdisciplinary Understanding**. In the MDOE, soldiers must possess a deep understanding of the interactions and dependencies between different domains. For example, they need to grasp how space-based assets support communication and navigation on the ground or how cyber operations can impact information warfare efforts. This interdisciplinary understanding facilitates better coordination, fosters innovative solutions, and empowers military personnel to make informed decisions in complex, multifaceted scenarios.

- **Global Recruitment and Diversity**. Modern military forces have expanded their recruitment efforts globally, transcending geographical boundaries. This global recruitment approach enhances diversity within the military ranks, bringing in personnel with varied cultural backgrounds, languages, and perspectives. Such diversity not only enriches the military but also bolsters adaptability and the ability to operate effectively in diverse environments – a hallmark of the MDOE.

❖ **Logistics and Supply Chain Management**. The complexity of modern warfare necessitates advanced logistics and supply chain management. Military forces operate with intricate global supply chains to ensure that troops have access to the necessary equipment, supplies, and resources when and where they are needed. Effective logistics and supply chain management are foundational to maintaining operational readiness.

❖ **Rapid Decision-Making**. Real-time data and communication systems are pivotal in the MDOE, enabling rapid decision-making to respond swiftly to dynamic threats and changing circumstances. Commanders and military personnel must be prepared to make informed decisions under high-pressure conditions, often with minimal time for deliberation.

❖ **Ethical and Legal Compliance**. Adherence to ethical and legal standards is a non-negotiable aspect of human resource readiness in the MDOE. Military operations must strictly adhere to international laws of armed conflict, rules of engagement, and ethical guidelines. Ensuring that all actions are in compliance with these standards is not only a matter of morality but also essential for maintaining the legitimacy of military operations in the eyes of the international community.

❖ **Adaptability and Resilience**. Adaptability and resilience are qualities instilled in military personnel in the MDOE. They must be prepared to adjust quickly to changing circumstances and environments, for the battlefield is no longer a static theater of war. The ability to persevere in the face of adversity, to overcome unforeseen challenges, and to remain effective amid dynamic conditions is crucial for maintaining operational readiness.

❖ **Psychological Support**. Mental health and psychological support programs have gained prominence in modern military forces. The psychological well-being of military personnel is a paramount consideration in the MDOE. Soldiers often face immense stress and trauma in the course of their duties, and addressing these mental health needs is not just a matter of compassion but also essential for maintaining morale and mission effectiveness.

❖ **Cybersecurity and Information Security**. In the interconnected MDOE, cybersecurity and information security

are paramount. Military personnel must be trained to recognize and respond to cyber threats and information warfare tactics. Protecting sensitive information and communications is essential to maintaining operational security and ensuring that vital information remains confidential.

HUMAN RESOURCES CHALLENGES

❖ **Specialized Training and Expertise**. One of the foremost challenges in human resource management within the MDOE is the need for specialized training and expertise. Unlike traditional warfare, where basic combat skills sufficed, military personnel now require domain-specific knowledge and skills. Soldiers must excel not only in traditional combat but also in cyber warfare, space operations, information warfare, and more. Achieving this level of specialization demands significant investments in training and education, posing logistical and financial challenges.

❖ **Rapid Technological Advancements**. The breakneck pace of technological advancement is another pressing challenge. In the MDOE, military personnel must continually update their knowledge and skills to keep pace with evolving technology. This rapid evolution demands constant retraining and adaptation, requiring military organizations to allocate resources effectively to stay at the forefront of technological capabilities.

❖ **Interdisciplinary Understanding**. Understanding the intricate interactions between different domains is paramount in the MDOE. Military personnel need to grasp how actions in one domain can affect others and how to collaborate effectively across domains. Achieving this interdisciplinary understanding is complex and necessitates comprehensive training programs that bridge gaps between traditionally separate military branches and roles.

❖ **Recruitment and Diversity**. Expanding recruitment efforts to enhance diversity is a laudable goal, but it comes with its own set of challenges. Managing a diverse force with varying cultural backgrounds, languages, and educational levels requires careful planning. Additionally, building unity and cohesion among a diverse group of soldiers can be challenging, demanding strong leadership and cultural sensitivity.

❖ **Logistical Complexity**. The logistical challenges in the MDOE are staggering. Maintaining supply chains for specialized equipment, technology, and resources across multiple domains requires a high degree of sophistication. Ensuring that troops have access to the necessary tools and support in diverse operational theaters is a formidable logistical challenge that demands meticulous planning and execution.

❖ **Cybersecurity and Information Security**. The interconnected nature of the MDOE exposes military forces to cyber threats and information warfare. Preparing soldiers to recognize and respond to these threats requires ongoing training and vigilance. Protecting sensitive information and communication systems is vital for maintaining operational security and mission effectiveness.

❖ **Ethical and Legal Compliance**. Adherence to ethical and legal standards is non-negotiable in the MDOE. Military operations must strictly comply with international laws of armed conflict, rules of engagement, and ethical guidelines. Ensuring that all personnel are well-versed in these standards and consistently apply them in complex and dynamic scenarios is a significant challenge that hinges on effective training and ethical leadership.

❖ **Adaptability and Resilience**. The MDOE demands adaptability and resilience from military personnel. They must be prepared to navigate rapidly changing circumstances and environments, often with limited information and resources. Fostering these qualities in soldiers is an ongoing challenge that requires continuous training, leadership development, and support systems.

❖ **Psychological Support**. The psychological toll of warfare in the MDOE can be immense. Soldiers frequently face high levels of stress, trauma, and extended deployments. Providing adequate mental health support, addressing post-traumatic stress, and promoting well-being are not just moral imperatives but essential components of maintaining morale and mission effectiveness.

CONCLUSION

In conclusion, human resource management in the Multi-Domain Operating Environment presents a labyrinth of challenges. From specialized training and technological advancements to interdisciplinary understanding and diversity management, the demands are multifaceted and demanding. Yet, effective human resource management is the linchpin of military readiness and adaptability in this complex era of warfare. Addressing these challenges with strategic planning, resource allocation, and a commitment to continuous improvement is essential for the success and resilience of modern armed forces in the MDOE.

In the Multi-Domain Operating Environment, human resource readiness is the linchpin of military effectiveness. It encompasses specialized training, technological proficiency, interdisciplinary understanding, global recruitment and diversity, logistics and supply chain management, rapid decision-making, ethical compliance, adaptability, resilience, psychological support, and cybersecurity. The dynamic and interconnected nature of modern warfare necessitates a comprehensive approach to preparing and equipping military personnel for the multifaceted challenges they will face on the 21st-century battlefield. In this environment, readiness is not a static state but an ongoing commitment to excellence and adaptability in the face of ever-evolving threats and complexities.

To summarise, several military forces throughout the world use a variety of indicators of human resource preparedness. Many armed forces have performed extensive research and studies on determining preparedness, which include a variety of variables, domains, and aspects. The twenty-first century is a time of upheaval, uncertainty, complexity, and ambiguity. Because the environment is changing so quickly, numerous measures are required to solve the various issues that arise when running command and control-oriented military organisations. As a result, military leadership today must maximise the use of modern management tools and current demands that may arise from the rapidly changing environment, thus broadening military leadership's perspective today in order to improve the performance of individual members and military organisations as a whole.

Commanders must also build, ensure, and preserve shared decision-making understanding. In the context of multidomain operations, risk analysis and essential intelligence and information requirements create conditions that empower subordinate leaders, promote disciplined initiative, and impact decentralised operations. As

a result, new frameworks for comprehending multidomain operation command connections and staff organisations are needed. A multi domain operation synchronisation method that provides commanders with a tool for dealing with these new needs may also be required. Unlike traditional operations processes, which are developed primarily during the military decision-making process or the Joint planning process and are designed to address single-domain planning, a multi domain operation synchronisation process evolves from continuous collaboration between commanders and across domains and environments throughout planning and execution, creating and maintaining shared understanding of key decisions, associated risks, and related critical intelligence.

We must not lose sight of the timeless teachings of our past as we turn to the future. As an example, the American Soldier is the crux of the success of their Army. Personnel are ultimately what makes American success, from Lexington and Concord to the beaches of Normandy and the mountains of Afghanistan. No amount of technology advancement, global positional advantage, or any facet of war-making can suffice unless they are wielded by the greatest Soldiers and Leaders. As a result, the human capital enterprise will reform to ensure that human resources continue to be a superior capacity capable of forging relationships, adapting to complicated battlefields, persevering, and winning the battle.

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MULTI-DOMAIN OPERATING ENVIRONMENT – HUMAN RESOURCES READINESS AND CHALLENGE

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INTRODUCTION

The Multi-Domain Operating Environment (MDOE) has emerged as a paradigm shift in military operations, reflecting the growing complexities and interconnectedness of the modern battlefield. It encompasses the integration of various domains, such as land, sea, air, space, and cyberspace, where operations are conducted simultaneously and interdependently. In this dynamic environment, the readiness of human resources becomes a crucial factor in effectively navigating and succeeding in the MDOE (Smith, J. D et al., 2021).

The MDOE offers special possibilities and challenges for human resource preparation. The conventional tasks and responsibilities of military personnel change significantly when domain boundaries erode and enemies take advantage of technological convergence. To work across many domains, adapt to constantly changing situations, and effectively use cutting-edge technologies, human resources must possess a broad range of skills, knowledge, and competencies. In order to achieve and sustain human resource readiness in the MDOE, a comprehensive strategy encompassing a number of crucial elements is required. To first and foremost provide staff with the requisite domain-specific knowledge and abilities, comprehensive training and education programs must be created. This entails knowing the technology used within each discipline, comprehending its nuances, and cultivating a mindset that values multidisciplinary collaboration.

Additionally, a dedication to continued professional development and continual learning is necessary for human resources readiness in the MDOE. This entails keeping up with technology developments, comprehending new threats and strategies, and continuously polishing both individual and group skills through dynamic and realistic training activities. A culture of innovation and adaptation must also be fostered since employees need to be given the freedom to think critically, come up with creative solutions to issues, and accept new ideas in a constantly changing operational environment.

The MDOE's human resource readiness issues should not be disregarded, nevertheless. Given the increasing need for workers with technological proficiency and domain-specific knowledge, finding and keeping skilled employees with the requisite skill sets can be challenging. Additionally, the quick speed of technology development makes it difficult to adequately prepare and train staff to use new tools and systems. Furthermore, it is crucial for the MDOE to ensure efficient coordination and interoperability among various services, organisations, and partner countries. In order to leverage joint capabilities and collaborate seamlessly across domains to achieve mission objectives, human resources are required. Technical interoperability is necessary, but it's also important to have effective communication, understanding, and a shared operating vision in order to achieve this degree of coordination.

In conclusion, mission effectiveness in the Multi-Domain Operating Environment depends critically on human resource readiness. It is crucial to provide employees with the talents, knowledge, and skills needed to work across several domains, adapt to new technology, and promote an innovative and adaptable culture. In order to create a workforce that is both highly competent and resilient, it is imperative to overcome difficulties in interoperability, training, and recruitment. Organisations may make sure that their human resources are ready to successfully navigate the MDOE's intricacies and gain victory in a more interconnected and competitive operational landscape by tackling these preparedness elements and difficulties.

DISCUSSION

Human resources readiness in the Multi Domain Operating Environment (MDOE) is a critical aspect of ensuring mission success and maintaining a competitive edge in modern warfare. The MDOE, with its integration of various domains, presents unique challenges and opportunities for human resources. In this discussion, we will delve deeper into the factors influencing human resources readiness in the MDOE and the challenges that need to be addressed (United States Department of Defense., 2018).

One of the key factors influencing human resources readiness in the MDOE is comprehensive training and education. Personnel must receive specialized training that equips them with domain-specific knowledge and skills to operate effectively across multiple domains. This includes understanding the intricacies of each domain, mastering

the technologies employed within them, and developing the ability to integrate and synchronize operations across domains.

Technological proficiency is another crucial aspect of human resources readiness in the MDOE. With the increasing reliance on advanced technologies and systems, personnel must be trained to effectively utilize and exploit these tools. Continuous training and professional development programs are necessary to keep personnel updated on the latest advancements and ensure they can effectively operate complex equipment.

Interdisciplinary collaboration is essential in the MDOE, as operations often involve personnel from different services, agencies, and partner nations. Human resources must possess strong interpersonal and communication skills to work seamlessly with counterparts from various domains. This includes understanding each domain's unique capabilities, limitations, and operational procedures, fostering a culture of cooperation and joint integration.

Adaptability and flexibility are critical qualities for human resources in the MDOE. The operational environment is dynamic, with rapidly changing situations and emerging threats. Personnel must be able to quickly adjust tactics, techniques, and procedures to counter these challenges. Developing a mindset that embraces innovation, critical thinking, and continuous learning is vital to ensure personnel can adapt effectively in this ever-evolving environment.

Recruitment and retention of qualified personnel pose significant challenges in the MDOE. The demand for individuals with diverse skill sets and expertise often exceeds the available talent pool. Organizations must implement effective recruitment strategies, offer competitive incentives, and provide opportunities for career growth and advancement to attract and retain top talent. Additionally, efforts should be made to enhance diversity and inclusion within the workforce to promote varied perspectives and innovative solutions.

Ethical and legal considerations also play a crucial role in human resources readiness in the MDOE. The integration of advanced technologies raises ethical questions and requires personnel to navigate complex legal frameworks. Training on ethical conduct, legal compliance, and the responsible use of technology is essential to ensure personnel can operate within ethical boundaries and adhere to applicable laws and regulations.

Human resources readiness in the Multi Domain Operating Environment is a multifaceted challenge. It requires comprehensive training, technological proficiency, interdisciplinary collaboration, adaptability, and effective recruitment and retention strategies. By addressing these factors and challenges, organizations can cultivate a highly capable and versatile workforce capable of effectively operating in the MDOE. This, in turn, will contribute to mission success and maintaining a competitive edge in modern warfare.

COMPREHENSIVE TRAINING AND EDUCATION

In the MDOE, personnel need to possess domain-specific knowledge and skills to operate effectively across multiple domains. Comprehensive training and education programs should be developed to provide personnel with the necessary technical expertise, tactical proficiency, and understanding of the interdependencies between domains. This includes specialized training in areas such as cyber warfare, space operations, and joint integration to enhance the versatility and adaptability of human resources.

Comprehensive training and education are vital for human resources readiness in the Multi Domain Operating Environment (MDOE). The complexity of the MDOE requires personnel to possess domain-specific knowledge and skills that go beyond traditional military training. To ensure effective operations across multiple domains, specialized training programs should be developed. These programs should provide personnel with the technical expertise and tactical proficiency necessary to navigate and operate within each domain. For example, training in cyber warfare will enable personnel to understand and defend against cyber threats, while space operations training will equip them with the knowledge to utilize space-based assets effectively.

Additionally, joint integration training is crucial for fostering interoperability among different domains. This training focuses on building collaborative skills and ensuring seamless coordination between personnel from various services and agencies. By understanding the interdependencies between domains, personnel can work together more effectively, leveraging each domain's unique capabilities to achieve mission objectives. Furthermore, it is essential to incorporate realistic and dynamic training scenarios into the education programs. Simulations and exercises that replicate the challenges faced in the MDOE can help personnel develop critical thinking skills, decision-making abilities, and adaptability. These training activities should simulate the integration of multiple domains,

allowing personnel to practice coordinating operations in complex environments.

Continuous education and professional development programs should also be implemented to keep personnel updated on the latest advancements and emerging technologies. This includes staying informed about new developments in each domain and understanding how they can be leveraged to gain a competitive edge. By fostering a culture of continuous learning, organizations can ensure that personnel remain adaptable and capable of effectively utilizing evolving technologies.

In conclusion, comprehensive training and education programs are crucial for human resources readiness in the MDOE. By providing personnel with domain-specific knowledge, interdisciplinary collaboration skills, and a mindset of continuous learning, organizations can equip their workforce with the necessary tools to operate effectively across multiple domains. Through these efforts, human resources can adapt to the challenges of the MDOE and contribute to mission success.

TECHNOLOGICAL PROFICIENCY

The MDOE heavily relies on advanced technologies and systems. Human resources must be equipped with the knowledge and skills to effectively utilize and exploit these technologies. This requires continuous training and professional development to stay updated on the latest advancements and to master the operation of complex equipment. Additionally, fostering a culture of innovation and technological adaptation is crucial to encourage personnel to embrace emerging technologies and incorporate them into their operational practices.

Technological proficiency is a critical aspect of human resources readiness in the Multi Domain Operating Environment (MDOE). As the MDOE heavily relies on advanced technologies and systems, personnel must be equipped with the knowledge and skills to effectively utilize and exploit these technological advancements. Continuous training and professional development programs are essential to ensure that personnel stay updated on the latest advancements in technology. This includes staying informed about new equipment, systems, and software relevant to their respective domains. By keeping abreast of technological developments, personnel can remain effective in their roles and take advantage of the capabilities offered by these advancements.

Mastering the operation of complex equipment is crucial in the MDOE. Personnel need to be proficient in operating and maintaining advanced systems across different domains. Training should encompass hands-on experience and practical exercises to enhance their technical expertise. This can involve simulated scenarios, training simulations, and realistic exercises that replicate operational environments.

Fostering a culture of innovation and technological adaptation is equally important. Organizations should encourage personnel to embrace emerging technologies and explore ways to incorporate them into their operational practices. This can be achieved by providing platforms for idea sharing, supporting research and development efforts, and facilitating collaboration between personnel and technology experts. By fostering an environment that values innovation and technological proficiency, organizations can stay at the forefront of technological advancements.

Furthermore, organizations should invest in research and development to identify and evaluate emerging technologies relevant to the MDOE. This proactive approach allows for early adoption and integration of new technologies, giving personnel a competitive edge in operations. Regular technology assessments and evaluations can help identify gaps, prioritize investments, and ensure that the technological capabilities of human resources remain aligned with the evolving needs of the MDOE.

In conclusion, technological proficiency is a key component of human resources readiness in the MDOE. Continuous training and professional development, along with a culture of innovation and technological adaptation, are essential to equip personnel with the necessary skills and knowledge to effectively utilize advanced technologies. By investing in technological proficiency, organizations can enhance operational effectiveness, maintain a competitive advantage, and successfully navigate the complexities of the MDOE.

INTERDISCIPLINARY COLLABORATION

Successful operations in the MDOE require effective coordination and collaboration among personnel from different domains. Human resources must possess the ability to work seamlessly with counterparts from various services, agencies, and partner nations. This necessitates strong interpersonal and communication skills, as well as an understanding of the unique capabilities, limitations, and operational procedures of each domain.

Joint exercises and training programs can facilitate the development of these collaborative skills.

Interdisciplinary collaboration is essential for human resources readiness in the Multi-Domain Operating Environment (MDOE). As operations in the MDOE involve personnel from different domains, services, agencies, and partner nations, effective coordination and collaboration are critical for mission success. Strong interpersonal and communication skills are vital in fostering seamless collaboration. Personnel must be able to communicate effectively with counterparts from various domains, understanding and conveying complex information in a clear and concise manner. This includes not only verbal communication but also active listening and understanding non-verbal cues to ensure effective understanding and collaboration.

A key aspect of interdisciplinary collaboration is the understanding of each domain's unique capabilities, limitations, and operational procedures. Personnel should familiarize themselves with the functions and operational concepts of other domains, enabling them to appreciate the contributions and challenges of their counterparts. This understanding facilitates better integration and synchronization of operations across domains, maximizing the overall effectiveness of joint missions.

Joint exercises and training programs play a crucial role in developing and enhancing collaborative skills. These activities provide opportunities for personnel from different domains to work together in simulated environments, practicing joint planning, decision-making, and execution of operations. Through these exercises, personnel can learn to appreciate the strengths and limitations of each domain, build trust, and develop effective teamwork and coordination.

Furthermore, organizations can facilitate interdisciplinary collaboration by establishing forums, platforms, and working groups that promote information sharing and collaboration among personnel from different domains. These platforms provide a space for personnel to exchange ideas, share best practices, and develop joint solutions to common challenges. Regular meetings, workshops, and conferences can also foster networking and relationship-building among personnel, strengthening interdisciplinary ties. By fostering a culture of collaboration and joint integration, organizations can overcome the potential barriers and silos that may exist among different domains. This collaborative mindset encourages the pooling of expertise, resources, and perspectives, leading to innovative and comprehensive solutions in the MDOE.

In conclusion, interdisciplinary collaboration is crucial for human resources readiness in the MDOE. Strong interpersonal and communication skills, along with an understanding of each domain's capabilities and operational procedures, are essential for effective collaboration. Through joint exercises, training programs, and the establishment of collaborative platforms, organizations can enhance interdisciplinary collaboration and maximize the operational effectiveness of personnel in the MDOE.

ADAPTABILITY AND FLEXIBILITY

The MDOE is characterized by rapidly changing operational environments and emerging threats. Human resources must be adaptable and flexible in their approach, capable of quickly adjusting tactics, techniques, and procedures to counter evolving challenges. This requires a mindset that embraces innovation, critical thinking, and the ability to quickly learn and integrate new information and strategies into operations. Regular scenario-based training and exercises can help cultivate these adaptive qualities.

Indeed, adaptability and flexibility are essential qualities for human resources readiness in the Multi Domain Operating Environment (MDOE). The dynamic nature of the MDOE, with its rapidly changing operational environments and emerging threats, demands personnel who can quickly adjust their tactics, techniques, and procedures to counter evolving challenges.

An adaptable mindset is crucial in the MDOE. Personnel should embrace innovation and be open to new ideas, technologies, and strategies. They should be willing to challenge conventional thinking and explore alternative approaches to problem-solving. This mindset encourages continuous learning and improvement, enabling personnel to stay ahead of the curve and effectively respond to changing circumstances.

Critical thinking skills are vital in fostering adaptability. Personnel should be able to analyze complex situations, assess risks and opportunities, and make informed decisions in dynamic environments. This involves gathering and evaluating information from various sources, considering multiple perspectives, and adapting strategies accordingly. Critical thinking enables personnel to identify creative solutions and adapt their approaches to match the evolving needs of the MDOE.

The ability to quickly learn and integrate new information and strategies is also crucial. Personnel should be receptive to ongoing training and professional development opportunities, staying updated on emerging trends, technologies, and best practices. Regular scenario-based training and exercises provide realistic and dynamic environments for personnel to practice adaptability and hone their skills in responding to unexpected situations.

Furthermore, organizational support is necessary to foster adaptability and flexibility. Leaders should encourage a culture that values innovation, experimentation, and continuous improvement. They should empower personnel to take initiative, make decisions, and provide feedback for process refinement. By creating an environment that supports adaptability, organizations can unlock the full potential of their human resources in the MDOE.

In conclusion, adaptability and flexibility are crucial qualities for human resources readiness in the MDOE. An adaptable mindset, coupled with critical thinking skills and the ability to quickly learn and integrate new information, enables personnel to effectively respond to rapidly changing operational environments. Through regular training, a culture of innovation, and organizational support, organizations can cultivate and enhance the adaptability and flexibility of their human resources, ensuring mission success in the MDOE.

RECRUITMENT AND RETENTION

Attracting and retaining qualified personnel with the necessary skills and expertise is a significant challenge in the MDOE. The demand for individuals proficient in multiple domains, with expertise in emerging technologies, often exceeds the available talent pool. Organizations must employ effective recruitment strategies, offer competitive incentives, and provide opportunities for career growth and advancement to attract and retain top talent. Additionally, efforts should be made to enhance diversity and inclusion within the workforce to promote varied perspectives and innovative solutions.

Recruitment and retention of qualified personnel in the Multi Domain Operating Environment (MDOE) pose significant challenges. The need for individuals with expertise in multiple domains and emerging technologies often surpasses the available talent pool. To address this, organizations must employ effective recruitment strategies and implement measures to attract and retain top talent.

One crucial aspect of recruitment is the development of targeted strategies to attract individuals with the necessary skills and expertise. This can involve proactive outreach to academic institutions, professional networks, and specialized training programs. Organizations should highlight the unique opportunities and challenges of the MDOE, emphasizing the potential for career growth, cutting-edge technology utilization, and the impact of working in a dynamic and complex operational environment.

Offering competitive incentives is vital to attract and retain qualified personnel. This includes competitive compensation packages, comprehensive benefits, and opportunities for professional development and advancement. Organizations should also consider non-monetary incentives such as flexible work arrangements, recognition programs, and a supportive work-life balance.

Career growth and advancement opportunities play a significant role in retaining talent in the MDOE. Personnel should be provided with clear pathways for progression, including opportunities for specialization, leadership roles, and participation in high-profile projects. Mentoring programs and ongoing training and education support can enhance professional development, ensuring that personnel feel valued and have a clear trajectory for advancement within the organization.

Efforts to enhance diversity and inclusion within the workforce are essential. By fostering a diverse and inclusive environment, organizations can tap into varied perspectives, experiences, and ideas. This promotes innovation and creativity, leading to more effective solutions and decision-making in the MDOE. Organizations should strive to create an inclusive culture that values and respects diversity and provides equal opportunities for all individuals.

Furthermore, organizations should actively engage in talent retention strategies. This involves fostering a positive work environment, providing opportunities for meaningful work and challenging assignments, and promoting a healthy work-life balance. Regular feedback and performance evaluations can help identify individual strengths and areas for improvement, allowing for targeted development plans that enhance job satisfaction and retention.

In conclusion, recruitment and retention of qualified personnel in the MDOE require proactive strategies and incentives. Effective recruitment measures, competitive incentives, career growth opportunities, and efforts to enhance diversity and inclusion are crucial.

By implementing these strategies, organizations can attract and retain top talent, ensuring a skilled and diverse workforce capable of meeting the challenges of the MDOE and driving mission success.

ETHICAL AND LEGAL CONSIDERATIONS

The MDOE presents complex ethical and legal challenges that human resources must navigate. The integration of advanced technologies, such as autonomous systems and artificial intelligence, raises questions about the appropriate use of force, privacy concerns, and adherence to international norms and regulations. Human resources readiness includes instilling a strong ethical foundation, providing legal training, and ensuring compliance with applicable laws and regulations.

Ethical and legal considerations are crucial aspects of human resources readiness in the Multi Domain Operating Environment (MDOE). The integration of advanced technologies and the complexity of operations in the MDOE raise important ethical and legal challenges that must be addressed. One key aspect is instilling a strong ethical foundation within human resources. Personnel should be educated on the ethical implications of their actions and the potential impact on individuals, societies, and international norms. This includes understanding the principles of proportionality, distinction, and the appropriate use of force. Ethical training should emphasize the importance of upholding human rights, respecting cultural differences, and adhering to the principles of international humanitarian law.

Legal training is essential to ensure that personnel are aware of and compliant with applicable laws and regulations. This includes familiarizing personnel with the legal frameworks governing operations in the MDOE, such as domestic laws, international treaties, and rules of engagement. Human resources should understand their legal responsibilities, including the protection of civilian populations, respect for human rights, and compliance with lawful orders.

Organizations should establish clear guidelines and procedures to address ethical and legal challenges in the MDOE. This includes establishing robust oversight mechanisms, conducting regular reviews and assessments, and providing channels for reporting potential ethical or legal concerns. Encouraging a culture of ethical behavior and accountability is crucial to ensure that personnel make informed decisions and act in accordance with legal and ethical standards.

Additionally, organizations should engage with relevant stakeholders, including legal advisors, international organizations, and governmental agencies, to stay updated on evolving legal and ethical considerations in the MDOE. Regular training, workshops, and discussions on ethical and legal issues can enhance awareness and understanding among human resources.

Finally, organizations should establish mechanisms for continuous evaluation and improvement of ethical and legal practices in the MDOE. This includes analyzing past operations, identifying lessons learned, and implementing necessary changes to enhance ethical decision-making and legal compliance. Ethical and legal considerations play a vital role in human resources readiness in the MDOE. By instilling a strong ethical foundation, providing legal training, and ensuring compliance with applicable laws and regulations, organizations can navigate complex ethical and legal challenges. This enables human resources to operate in a manner that upholds ethical standards, respects legal obligations, and contributes to the overall success and legitimacy of operations in the MDOE.

In conclusion, human resources readiness in the Multi-Domain Operating Environment is crucial for operational success. It requires comprehensive training, technological proficiency, interdisciplinary collaboration, adaptability, and recruitment and retention of qualified personnel. Overcoming these challenges will enable organizations to develop a highly capable and versatile workforce capable of effectively operating in the MDOE. By investing in human resources readiness, organizations can enhance their operational effectiveness, maintain a competitive advantage, and successfully navigate the complexities of the modern battlefield.

CONCLUSION

In conclusion, achieving human resources readiness in the Multi-Domain Operating Environment (MDOE) requires a comprehensive approach that addresses various aspects of preparation, adaptation, and compliance. The MDOE presents unique challenges and opportunities for human resources, necessitating careful consideration of factors such as training and education, technological proficiency, interdisciplinary collaboration, adaptability and flexibility, recruitment and retention, as well as ethical and legal considerations.

Comprehensive training and education programs are crucial to equip personnel with the domain-specific knowledge and skills needed

to operate effectively across multiple domains. This includes specialized training in emerging areas such as cyber warfare and space operations, as well as joint integration exercises to enhance versatility and adaptability.

Technological proficiency is essential in the MDOE, given its heavy reliance on advanced technologies and systems. Human resources must continuously update their knowledge and skills to effectively utilize and exploit these technologies. Fostering a culture of innovation and technological adaptation encourages personnel to embrace emerging technologies and incorporate them into operational practices.

Interdisciplinary collaboration is vital for successful operations in the MDOE. Human resources must possess strong interpersonal and communication skills, along with an understanding of the unique capabilities and operational procedures of different domains. Joint exercises and training programs promote effective coordination and collaboration among personnel from various services, agencies, and partner nations.

Adaptability and flexibility are critical qualities for human resources in the MDOE. Personnel must be capable of quickly adjusting tactics, techniques, and procedures to counter evolving challenges. An adaptable mindset, coupled with critical thinking skills and the ability to quickly learn and integrate new information, enables personnel to respond effectively to changing operational environments. Recruitment and retention of qualified personnel pose challenges in the MDOE. Organizations must employ effective strategies to attract and retain top talent, such as targeted recruitment efforts, competitive incentives, career growth opportunities, and efforts to enhance diversity and inclusion.

Ethical and legal considerations are fundamental in the MDOE. Human resources must operate within the boundaries of international norms and regulations, addressing complex ethical challenges and legal obligations. Instilling a strong ethical foundation, providing legal training, and establishing mechanisms for compliance and accountability are essential components of human resources readiness.

In summary, achieving human resources readiness in the MDOE requires a holistic approach that encompasses training, technological proficiency, collaboration, adaptability, recruitment, and adherence to ethical and legal considerations. By addressing these

factors, organizations can ensure that their human resources are well-prepared, versatile, and capable of effectively navigating the challenges and opportunities presented by the MDOE. This, in turn, contributes to mission success and the maintenance of a competitive edge in modern warfare.

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MULTI-DOMAIN OPERATING ENVIRONMENT – LAND DOMAIN READINESS AND CHALLENGES, AND ITS IMPACT ON IMPLEMENTATION AT THE OPERATIONAL LEVEL INCLUDING ARMY'S DOCTRINE AND ORGANIZATION, TACTICS, TECHNIQUES AND PROCEDURES, TRAINING AND DEFENCE INDUSTRY AS WELL AS THE ADAPTATION MEASURES THAT NEED TO BE IMPLEMENTED

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INTRODUCTION

The Multi-Domain Operating Environment (MDOE) is a strategic framework that emphasizes the integration and synchronization of operations across multiple military domains, including land, air, sea, space, and cyber. It recognizes the complexity and interconnectedness of modern warfare and aims to leverage the combined capabilities of these domains to achieve military objectives (Department of Defence, 2018). MDOE goes beyond the traditional domain-centric approach and provides a framework for commanders to exploit the synergies between domains, gain a competitive edge, and maintain operational superiority.

One of the significant aspects of MDOE is its focus on joint operations and fostering collaboration between different military branches. By breaking down the barriers between domains, MDOE promotes a holistic approach to planning, executing, and assessing military operations. This enhances situational awareness, facilitates better decision-making, and maximizes the effectiveness of available resources (Joint Chiefs of Staff, 2018). The integration and synchronization of operations across domains enable commanders to leverage the capabilities of each domain, leading to more effective and coordinated military actions.

The increasing significance of cyber and space domains in modern warfare is another aspect addressed by MDOE. Adversaries can exploit vulnerabilities in these domains to launch disruptive attacks on critical infrastructure and military networks. MDOE recognizes the importance of integrating cyber and space capabilities into traditional land, air, and sea operations (Department of the Army, 2020). This integrated approach ensures that military forces can effectively counter emerging threats and maintain a strategic advantage (House & Mills, 2021). By incorporating cyber and space capabilities, MDOE enables

military forces to protect their critical assets and respond to adversaries operating in these domains.

DISCUSSION AND ANALYSIS

❖ Land Domain Readiness: Ensuring Effective Operations in a Multi-Domain Environment.

In a multi-domain operating environment (MDOE), the readiness of land forces is of paramount importance as they play a critical role in shaping and achieving military objectives (Mazurek & Johansen, 2018). Land forces serve as the foundation for operations across various domains, providing the physical presence and manoeuvrability required to secure and control territory. They enable the projection of power, protect critical infrastructure, and engage in close combat, if necessary. Therefore, their readiness directly impacts the success of operations in a multi-domain environment.

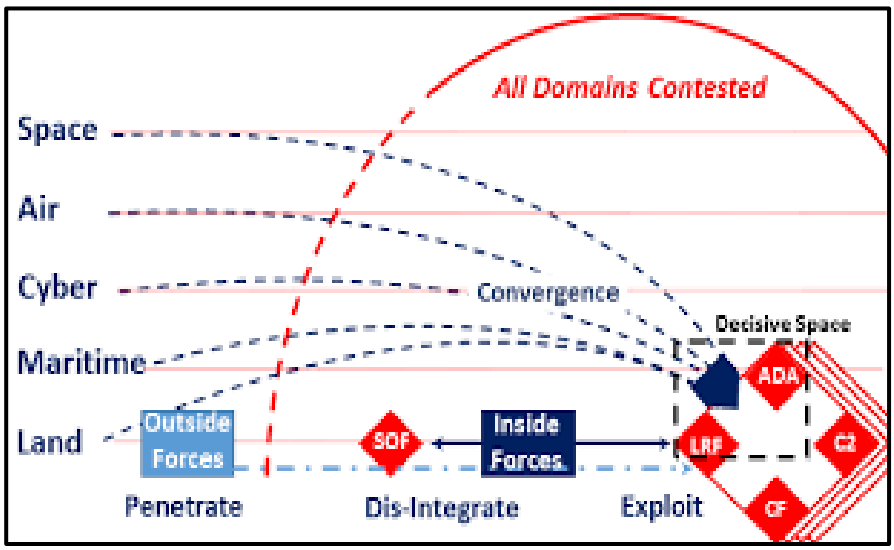

Figure 1: The U.S. Army in Multi-Domain Operations

Effective training programs are essential for land forces to operate proficiently in a multi-domain environment (Joint Chiefs of Staff, 2018). Comprehensive and realistic training exercises improve individual and collective skills, enhance interoperability with other military branches, and familiarize forces with joint operations. Training programs should incorporate scenarios that reflect the complexities and challenges of operating across multiple domains, ensuring that land forces are well-prepared for the realities of MDOE.

Technological integration plays a crucial role in enhancing the capabilities of land forces in a multi-domain environment (Scharre & Martineau, 2020). Advanced technologies, such as networked command and control systems and unmanned aerial and ground vehicles, improve situational awareness, facilitate information sharing, and enable rapid decision-making. **Figure 1** shows that US Army Integration with other domains through joint fire coordination and targeting systems further amplifies the effectiveness of land forces and enables seamless collaboration with other military branches.

The logistics and sustainment of land forces pose unique challenges in a multi-domain environment (Department of the Army, 2020). Robust logistical support, including supply chains, transport capabilities, and maintenance facilities, is crucial for sustaining forces in remote and contested areas. Resilient and secure communications networks enable real-time logistics management, ensuring timely and effective support to land forces operating across multiple domains.

Interoperability among land forces and other domains is a critical factor in MDOE (Department of the Army, 2020). Seamless coordination and integration of capabilities across domains enable combined arms operations and joint mission execution. Interoperability relies on standardized procedures, compatible communication systems, and shared situational awareness. Close cooperation and joint training exercises are necessary to foster effective coordination and information exchange among land forces and other military branches.

Furthermore, land forces must be adaptable and flexible in their operations within a multi-domain environment (Chief of Staff of the Army, 2019). They must be prepared to rapidly shift focus between domains based on the evolving dynamics of the battlefield. This requires agile decision-making processes, dynamic command and control structures, and a culture that values innovation and adaptability. Collaboration with allies and partner nations is another important aspect of land forces' readiness in a multi-domain environment (Rigby, 2020). Building and maintaining strong international relationships foster interoperability and enable collective efforts in achieving common objectives. By working closely with allied forces, land forces can benefit from shared experiences, knowledge, and resources, ultimately enhancing their readiness and effectiveness.

Continuous assessment and evaluation of land forces' readiness are essential to identify gaps and areas for improvement (United States Army Training and Doctrine Command, 2018). Regular exercises and simulations allow for the testing of operational concepts, the validation of training effectiveness, and the refinement of tactics and procedures. Lessons learned from previous operations and exercises should be incorporated into training programs to enhance the readiness of land forces in a multi-domain environment.

❖ **Integration of Land Forces in the Multi-Domain Operating Environment: Challenges and Considerations.**

The integration of land forces into a multi-domain operating environment (MDOE) is crucial for achieving military objectives and ensuring operational effectiveness. This article explores the challenges and considerations associated with integrating land forces into MDOE, highlighting the need for effective communication, command and control structures, interoperability, training, flexibility, collaborative planning, and cybersecurity.

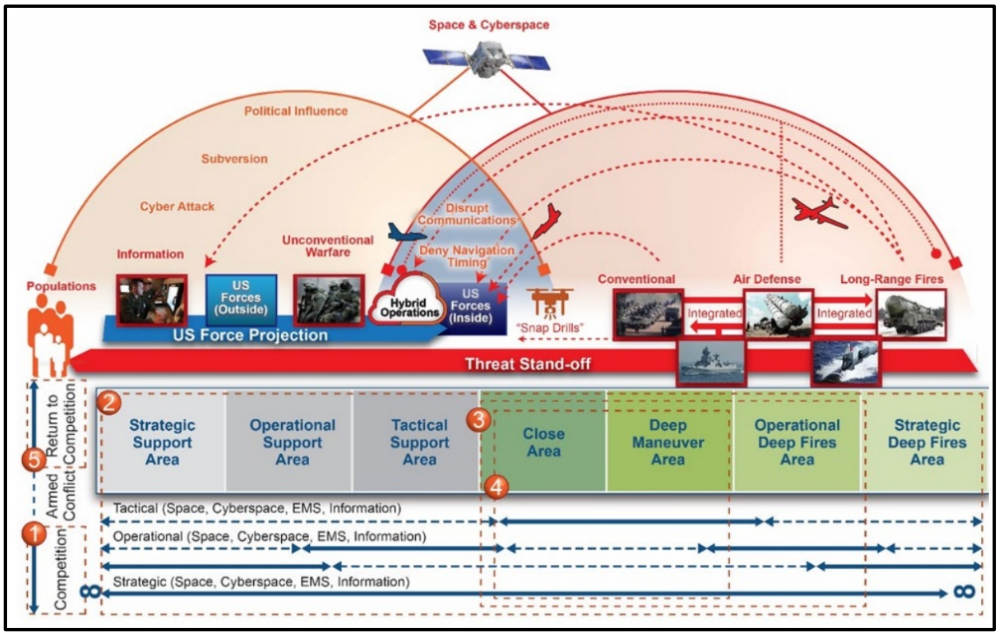

Figure 2: US Force in Multi-Domain Operation

Integrating land forces into MDOE requires addressing several challenges. Communication and information sharing across different domains pose barriers that must be overcome

through interoperable technologies and joint training programs (Department of the Army, 2020). Command and control structures must be robust, enabling centralized coordination and decentralized execution (Mazurek & Johansen, 2018). Interoperability and compatibility of equipment, systems, and procedures must be achieved to maximize the combined capabilities of all domains (Joint Chiefs of Staff, 2018). Training and education programs need to incorporate joint exercises and realistic scenarios to foster interoperability (United States Army Training and Doctrine Command, 2018).

Figure 2 shows that US Force flexibility and adaptability are vital for land forces operating in a multi-domain environment, requiring agile organizational structures and adaptable tactics (Chief of Staff of the Army, 2019). Collaborative planning and decision-making among domain experts promote effective coordination and information sharing (House & Mills, 2021). Cybersecurity and information assurance must be prioritized to protect critical infrastructure and ensure secure communication networks (Scharre & Martineau, 2020).

Integrating land forces into MDOE is essential for achieving military objectives. Overcoming communication barriers, establishing effective command and control structures, promoting interoperability, and prioritizing training and education are key considerations. Flexibility, collaborative planning, and cybersecurity measures further contribute to successful integration. By addressing these challenges and considering the aforementioned factors, military organizations can achieve seamless integration of land forces with other domains in the complex multi-domain operating environment (MDOE).

❖ Technology and Innovation in the Land Domain: Enhancing Capabilities and Readiness.

Technology and innovation have always been instrumental in shaping the capabilities and readiness of land forces. In the modern era, advancements in technology continue to revolutionize the land domain, enabling enhanced situational awareness, improved operational effectiveness, and increased readiness (Lewis et al., 2019). This article explores the role of technology and innovation in enhancing land domain capabilities and readiness, highlighting key areas where technological advancements have made significant contributions. Thus, it is logical that the impact of the digital economy on high-quality

development should also have spatial spillover effects, as the Conceptual Framework shown in **Figure 3**. It can be summarized by summarizing the assumptions on the relationship between the digital economy, technological innovation, and high economic quality.

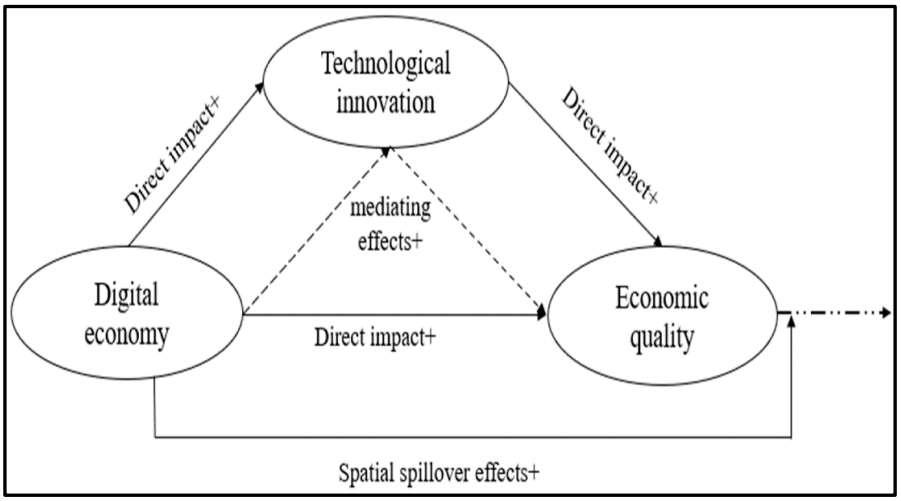

Figure 3: Conceptual Framework

Technology has greatly improved the situational awareness of land forces, providing them with a better understanding of the operating environment (H. G. Army, 2020). Advancements in sensors, including unmanned aerial systems (UAS) and satellites, offer real-time information on enemy movements, terrain conditions, and potential threats (U.S. Army, 2020). Geographic Information Systems (GIS) and advanced mapping technologies provide precise geospatial data, facilitating effective route planning, target identification, and mission execution (Dawood et al., 2019).

Innovation in communication technologies has significantly enhanced the coordination and synchronization of land forces (C. G. Command, 2019). Robust and secure communication networks enable seamless information sharing, supporting real-time command and control (C2) and improving decision-making (Mazurek & Johansen, 2018). Mobile communication systems, tactical radios, and advanced data links ensure quick and reliable communication, enhancing the operational effectiveness of land forces (Saeed et al., 2019).

Advancements in precision-guided munitions (PGMs) have revolutionized the effectiveness of land forces (Joint Chiefs of Staff, 2018). GPS-guided munitions enable accurate targeting, minimizing collateral damage (Scharre & Martineau, 2020). These technologies increase the lethality of land forces while reducing the risk to friendly troops and civilian populations. PGMs also extend the operational reach of land forces, enabling the engagement of targets at greater distances with higher precision (Chief of Staff of the Army, 2019).

Technological innovations have greatly enhanced the mobility and protection of land forces (Grimmer et al., 2020). Improved armoured vehicles, equipped with advanced armour materials, active protection systems, and enhanced mobility systems, provide increased survivability on the battlefield (United States Army Training and Doctrine Command, 2018). These advancements enable land forces to manoeuvre effectively and engage the enemy while minimizing vulnerability (United States Army, 2020).

Unmanned systems have become valuable assets in the land domain (C. G. Command, 2019). Unmanned ground vehicles (UGVs) perform reconnaissance, surveillance, and logistical tasks, reducing risks to human personnel (Lewis et al., 2019). Drones equipped with sensors and cameras provide real-time aerial reconnaissance, enhancing situational awareness and target acquisition (Dawood et al., 2019). Integration of artificial intelligence (AI) algorithms further enhances the autonomy and capabilities of these unmanned systems (Mazurek & Johansen, 2018).

While technology and innovation offer significant benefits, there are considerations and challenges to address. Cybersecurity and information assurance become critical factors as land forces rely on networked systems (H. G. Army, 2020). Robust cybersecurity measures, secure communication protocols, and training on cyber hygiene are necessary to protect against potential vulnerabilities and cyber threats (United States Army Training and Doctrine Command, 2018).

❖ **Interoperability Challenges for Land Forces in a Multi-Domain Environment: Solutions and Strategies.**

In a multi-domain operating environment (MDOE), the effective interoperability of land forces with other domains is essential for mission success. However, achieving interoperability poses significant challenges due to differences in equipment, communication systems, procedures, and doctrines. This article examines the interoperability challenges faced by land forces in a multi-domain environment and proposes potential solutions and strategies to overcome them.

The use of different communication systems, protocols, and data formats across domains hampers effective communication and information sharing. These disparities can result in delays, miscommunication, and reduced situational awareness, impacting operational effectiveness (Bergen et al., 2021). Integrating land forces' command and control structures with other domains present interoperability challenges. Varying command structures, decision-making processes, and situational awareness tools can impede joint planning and execution, leading to inefficiencies and coordination breakdowns (U.S. Department of Defence, 2018).

The integration of diverse equipment, systems, and sensors used by different domains introduces technological interoperability challenges. Incompatibilities in data formats, sensor capabilities, and network architectures hinder the seamless exchange and fusion of information, limiting the synergistic employment of capabilities across domains (Johnsen, 2019). Adopting common standards and data formats is crucial for achieving communication and information-sharing interoperability. Implementing standard operating procedures, common lexicons, and data exchange protocols facilitate seamless data integration (NATO, 2021). Collaborative efforts between military organizations and industry consortiums are essential in developing interoperability standards such as the Standard NATO Agreement (STANAG) and the Joint Architecture for Unmanned Systems (JAUS).

Investing in interoperable communication systems promotes cross-domain communication. Utilizing technologies such as software-defined radios and network-centric architectures enables seamless sharing of voice, video, and data (Saravanan et al., 2020). Standardized communication

interfaces should be developed and integrated to facilitate seamless communication and data sharing between different platforms. Conducting joint training and exercises is crucial for enhancing interoperability. Integrated training scenarios involving land, air, sea, space, and cyber forces foster familiarity, trust, and shared understanding among personnel from different domains (Bergen et al., 2021). Realistic exercises enable the identification and resolution of interoperability challenges, improving coordination and refining joint tactics, techniques, and procedures.

Establishing integrated command structures promotes unified decision-making and operational synchronization. Joint planning cells and cross-domain coordination mechanisms facilitate the exchange of information, collaboration, and interoperability (U.S. Department of Defence, 2018). Joint task forces and combined operational centres provide a unified command authority and shared situational awareness, ensuring effective coordination and mission execution. Promoting interdisciplinary education and cross-training initiatives enhances interoperability. Personnel should receive training that exposes them to the capabilities, limitations, and procedures of other domains (Johnsen, 2019). This broadens their understanding, facilitates effective communication, and promotes collaboration. Exchange programs and joint professional military education opportunities further enhance mutual understanding and interoperability.

❖ Joint Operations and the Coordination of Land Forces in a Multi-Domain Environment.

In modern warfare, the coordination of land forces with other military branches through joint operations is crucial for achieving success in a multi-domain environment. Joint operations involve the integrated efforts of land, air, sea, space, and cyber forces to achieve common objectives (Joint Chiefs of Staff, 2018). This article examines the role of joint operations and the coordination of land forces with other military branches in a multi-domain environment, emphasizing their significance and key considerations.

Joint operations enable the synergistic employment of diverse capabilities from different military branches. Land forces possess advantages such as physical presence, control of key terrain, and direct engagement with the enemy. When integrated

with the capabilities of other branches, such as air power, naval support, and cyber assets, joint operations leverage each branch's strengths and compensate for weaknesses, enhancing overall operational effectiveness (Smith, 2019).

The coordination of land forces with other military branches in joint operations leads to enhanced situational awareness. Air reconnaissance, satellite surveillance, and cyber intelligence provide critical information about the enemy's disposition, movements, and vulnerabilities. This shared situational awareness facilitates better decision-making, improves response times, and reduces the element of surprise, increasing the success rate of land operations (Joint Chiefs of Staff, 2018).

Joint operations offer operational flexibility by enabling land forces to exploit opportunities across multiple domains. Air power can provide close air support, strategic airlift, and airborne reconnaissance, while naval forces can conduct amphibious operations and provide maritime security. The coordination of land forces with other branches enhances manoeuvrability, enabling the exploitation of different operational environments and maximizing mission success (Smith, 2019).

Effective coordination in joint operations necessitates the seamless integration of command and control structures across military branches. A unified command authority facilitates centralized decision-making, promotes information sharing, and ensures coordinated execution. Integrated C2 systems, joint planning processes, and interoperable communication networks are essential for timely and synchronized operations (Joint Chiefs of Staff, 2018). Interoperability among different military branches is critical for successful joint operations. Interoperable systems, procedures, and communication platforms enable the exchange of information, coordination of actions, and synchronization of efforts. Standardized communication protocols, compatible equipment, and joint training exercises are vital to ensure interoperability and seamless coordination (NATO, 2021).

A shared understanding of capabilities, limitations, and operating procedures among personnel from different branches is essential for effective coordination. Joint training programs, education initiatives, and cross-branch exchanges promote

mutual understanding, trust, and familiarity with each other's capabilities. This enables effective communication, facilitates collaboration, and minimizes misunderstandings during joint operations (Smith, 2019).

Clear delineation of roles and responsibilities among military branches is critical for coordination in joint operations. Each branch should understand its specific tasks, objectives, and areas of support. Roles can include providing fire support, securing flanks, conducting reconnaissance, or providing logistical support. A clear definition of roles avoids duplication of efforts, reduces friction, and enhances the unity of effort in achieving shared objectives (Joint Chiefs of Staff, 2018).

❖ **Threats and Risks in the Land Domain: Assessing Challenges in a Multi-Domain Operating Environment.**

Operating in a multi-domain environment presents land forces with a diverse range of threats and risks that can have a profound impact on their operational effectiveness and mission success. The ability to identify and assess these specific threats and risks is essential in understanding the challenges they pose and the potential implications for military operations (Harrison, 2019).

One of the significant challenges faced by land forces in a multi-domain environment is the prevalence of hybrid warfare and asymmetric threats. Non-state actors, insurgent groups, and terrorist organizations often employ unconventional tactics that blend traditional warfare with elements of guerrilla warfare, information warfare, and cyber-attacks. These threats can disrupt supply lines, target civilian populations, and exploit vulnerabilities in communication and critical infrastructure, thereby undermining the ability of land forces to operate effectively (Simpson, 2018).

Adversaries frequently employ anti-access and area denial measures to impede the freedom of movement and limit the operational reach of land forces. A2/AD strategies involve the use of long-range precision weapons, anti-ship missiles, mines, and advanced air defence systems. These measures can deny land forces access to key areas, disrupt lines of communication, and threaten forward operating bases, significantly hampering their ability to manoeuvre and achieve operational objectives (Mazarr et al., 2020).

Electronic warfare (EW) and cyber threats present significant challenges to land forces operating in a multi-domain environment. Adversaries may employ various techniques, including jamming, spoofing, and electronic deception, to disrupt communication systems, command and control networks, and navigation systems. Cyber-attacks can target critical infrastructure, compromise sensitive information, and disrupt logistics, thereby undermining the operational capabilities of land forces and compromising situational awareness (Schaub Jr. & Schultz, 2019).

Land forces are particularly vulnerable to unconventional tactics and guerrilla warfare employed by adversaries in a multi-domain environment. Insurgent groups and non-state actors often exploit local populations, hide among civilians, and engage in hit-and-run tactics, ambushes, and the use of improvised explosive devices (IEDs). These asymmetric threats can degrade the morale of land forces, inflict casualties, and prolong conflicts, making stabilization and counterinsurgency operations challenging (Johnson & Mason, 2018).

The proliferation of advanced weapons and the potential use of weapons of mass destruction (WMD) present grave risks in the land domain. Adversaries may possess chemical, biological, radiological, or nuclear capabilities, posing threats to the safety of land forces and civilian populations. The potential use of these weapons in conflict zones or by non-state actors presents significant challenges in terms of force protection, decontamination, and the humanitarian consequences that may follow (Russell, 2019).

The prevalence of urban environments and complex terrains in modern conflicts poses unique challenges for land forces. Urban warfare requires specialized training, coordination with other military branches, and effective intelligence to navigate densely populated areas while minimizing collateral damage. Complex terrains, such as mountainous regions or dense forests, can impede mobility, limit line-of-sight communication, and provide cover for adversaries, thereby increasing operational risks for land forces (Laoutaris et al., 2020).

❖ **Training and Preparedness for Land Forces in a Multi-Domain Environment.**

Operating effectively in a multi-domain environment requires land forces to be well-trained, adaptable, and prepared to face the challenges of modern warfare. This article discusses the training requirements and preparedness measures necessary for land forces to operate effectively in a multi-domain environment, focusing on the key areas that enhance their readiness and capabilities.

Training for land forces in a multi-domain environment should include a comprehensive understanding of the capabilities, limitations, and operational procedures of other military branches. Cross-domain education and joint training programs facilitate the development of shared understanding, fostering effective communication and collaboration. This training enables land forces to better integrate and synchronize their efforts with other domains, enhancing operational effectiveness (Brandenburg et al., 2019).

Land forces must receive training in integrated command and control structures and processes. Joint training exercises that involve land, air, sea, space, and cyber forces help establish interoperability, promote information sharing, and enhance coordination. Familiarity with joint planning procedures, standardized communication protocols, and shared situational awareness tools improves land forces' ability to operate seamlessly within a multi-domain environment (Tawabini et al., 2020).

Training programs should focus on the effective integration of technology into land forces' operations. This includes training on the use of advanced equipment, sensors, and communication systems that facilitate interoperability with other domains. Land forces must be proficient in utilizing digital platforms, data fusion, and network-centric capabilities to exploit information superiority and make timely decisions in complex operational environments (Chirchiglia et al., 2021).

Land forces training in a multi-domain environment should emphasize adaptive thinking and decision-making skills. They must be prepared to rapidly adjust tactics, techniques, and procedures based on the evolving operational situation. Training scenarios that simulate dynamic and uncertain environments

help develop the ability to make informed decisions quickly, considering the capabilities and constraints of other domains (Meade et al., 2019).

Joint training exercises involving land, air, sea, space, and cyber forces are essential for developing effective coordination and integration. These exercises simulate realistic multi-domain operations, allowing land forces to train alongside other branches and develop mutual understanding, trust, and teamwork. Interdisciplinary training programs, such as cross-branch exchanges and joint professional military education, promote a broader perspective, fostering collaboration and enhancing land forces' ability to operate jointly (Kotze, 2019).

Training for land forces should include realistic and scenario-based exercises that replicate the complexities of a multi-domain environment. This involves training in urban warfare, complex terrains, hybrid threats, and asymmetric warfare tactics. Realistic training improves situational awareness, decision-making under stress, and adaptability to various operational challenges (Hoffman, 2018). Training and preparedness in a multi-domain environment require a commitment to continual learning and adaptation. Land forces should regularly evaluate lessons learned from operations and exercises, updating training programs and tactics to address emerging threats and challenges. This includes staying informed about technological advancements, evolving doctrines, and emerging operational concepts that impact land operations in a multi-domain environment (Maloy & Canna, 2020).

❖ **Logistics and Sustainment Challenges for Land Forces in a Multi-Domain Operating Environment: Strategies to Overcome.**

In a multi-domain operating environment, land forces face unique logistical and sustainment challenges that directly impact their operational effectiveness and mission success. This article explores the specific challenges encountered by land forces in logistics and sustainment and discusses strategies to overcome them to maintain readiness and operational capability.

Operating in a multi-domain environment often involves extended lines of communication for land forces. The need to project power across multiple domains increases the distance between supply bases and operational areas, resulting in longer

supply chains. This poses challenges in terms of transportation, security, and resupply (Chen et al., 2020). To overcome this challenge, land forces must prioritize efficient transportation systems, establish forward operating bases, pre-position supplies, and leverage air and sea assets for rapid deployment and sustainment (Cox, 2019).

Land forces operating in a multi-domain environment often require intermodal and multimodal transportation to move personnel, equipment, and supplies across different domains. This necessitates coordination between land, air, and sea transportation assets. Challenges include synchronization of schedules, interoperability of transportation systems, and seamless transfers between modes of transport (Dekker et al., 2021). Overcoming these challenges requires joint planning, standardized procedures, and interoperable logistics systems that facilitate smooth transitions and minimize disruption to the operational tempo (Cox, 2019).

Maintaining a resilient and responsive supply chain is crucial for land forces in a multi-domain environment. They must be able to adapt to changing operational requirements, unexpected disruptions, and dynamic threat environments. Strategies to enhance supply chain resilience include diversifying supply sources, developing redundant capabilities, implementing robust risk management practices, and leveraging technology for real-time tracking and visibility of critical supplies (Chen et al., 2020). Embracing innovative solutions, such as 3D printing and advanced analytics, can also improve supply chain responsiveness (Wiedenmeier et al., 2020).

In a multi-domain environment, land forces must be prepared for rapid deployment and forward logistics operations. Quick response times and the ability to establish temporary operational bases are critical for maintaining operational momentum and seizing opportunities. Strategies to address this challenge include pre-positioning equipment and supplies in strategic locations, maintaining rapid deployment units, employing modular and scalable logistics systems, and utilizing advanced expeditionary logistics capabilities (Ulusoy et al., 2021).

The diverse operating environments and extended operational periods in a multi-domain environment place additional strain on equipment, requiring efficient maintenance

and repair capabilities. Land forces must establish effective maintenance and repair processes, including predictive maintenance practices, forward repair teams, and modular maintenance capabilities (Wiedenmeier et al., 2020). Emphasizing training and equipping maintenance personnel with advanced diagnostic tools and repair equipment enhances operational readiness and reduces downtime (Cox, 2019).

Reliable and secure information and communication technology (ICT) systems are critical for effective logistics and sustainment in a multi-domain environment. Land forces must address challenges such as ensuring network resilience, protecting ICT systems from cyber threats, and integrating ICT systems across multiple domains. Adopting robust cybersecurity measures, employing encrypted communication channels, and developing interoperable ICT systems enhance information sharing, command and control, and situational awareness for logistics operations (Chen et al., 2020).

❖ **Future Trends and Developments Shaping Land Domain Readiness in a Multi-Domain Operating Environment.**

The land domain, operating within a multi-domain environment, is experiencing significant transformations driven by emerging trends, technologies, and concepts. This article explores key future trends and developments that are shaping land domain readiness and addressing the challenges in a multi-domain operating environment, highlighting their potential impact on military operations.

The future of land domain readiness lies in integrated network-centric warfare, where land forces seamlessly collaborate with other domains. This approach leverages advanced communication and information systems, enabling real-time data sharing, sensor integration, and coordinated decision-making across domains (Whiting, 2020). By embracing interoperability and joint planning, land forces can enhance their operational effectiveness, situational awareness, and overall mission success in a multi-domain environment.

Artificial intelligence (AI) and machine learning (ML) technologies are revolutionizing the land domain's capabilities and readiness. AI/ML algorithms can process vast amounts of data, identify patterns, and make predictive analyses, improving

intelligence gathering, target identification, and operational planning (Matuszewski et al., 2019). Additionally, autonomous systems, such as unmanned ground vehicles (UGVs) and drones, can assist land forces in reconnaissance, surveillance, and logistics operations, reducing risk and enhancing operational efficiency (Wagner et al., 2020).

Advancements in sensor technologies, data fusion, and augmented reality (AR) are enhancing land forces' situational awareness in a multi-domain environment. Integrated sensor networks, including unmanned aerial systems (UAS) and ground-based sensors, provide real-time information about the battlefield, enabling land forces to make informed decisions and quickly adapt to changing circumstances (Lutz et al., 2020). AR technologies, such as heads-up displays and smart goggles, offer real-time overlays of critical data, improving situational awareness and reducing cognitive load for soldiers (Cohen et al., 2019).

The Multi-Domain Battle concept is a framework that recognizes the interconnectedness of land, air, sea, space, and cyber domains. It emphasizes the need for land forces to operate jointly and integrate with other domains to counter and exploit adversary vulnerabilities. This concept emphasizes information warfare, cross-domain fires, and joint manoeuvre, enabling land forces to achieve dominance in a multi-domain environment (Dyke et al., 2018). Implementing the Multi-Domain Battle concept requires joint training, doctrine development, and technological integration across military branches.

The electromagnetic spectrum (EMS) is becoming increasingly contested in modern warfare. Land forces must effectively manage and exploit the EMS to gain a tactical advantage. Electronic warfare (EW) capabilities, such as electronic attack, electronic support, and electronic protection, are vital for land forces to disrupt adversary communications, defend against electronic threats, and maintain their operational security (Weed et al., 2020). Developing resilient EW systems and training personnel in EMS operations is critical for land-domain readiness in a multi-domain environment.

Future land forces must adapt their logistics systems to be resilient and agile in a multi-domain environment. Technologies such as additive manufacturing (3D printing) enable the on-demand production of spare parts and reduce

reliance on lengthy supply chains (Dyke et al., 2018). Advanced robotics and automation improve efficiency in transportation, maintenance, and resupply operations. Utilizing unmanned logistics systems and autonomous vehicles can enhance the speed and security of logistics support, ensuring sustained operations in contested environments (Barnett et al., 2019).

RECOMMENDATIONS

Land forces should prioritize joint training exercises that involve collaboration with other military branches and domains. These exercises should focus on integrated command and control, interoperability, and joint planning to enhance coordination and effectiveness in multi-domain operations. By engaging in regular joint training, land forces can improve their ability to work seamlessly with other domains, resulting in enhanced operational capabilities and mission success.

Land forces need to stay updated on emerging technologies and actively seek opportunities to incorporate them into their operations. This includes exploring the use of artificial intelligence, machine learning, autonomous systems, augmented reality, and advanced sensor technologies. By embracing these emerging technologies, land forces can improve their situational awareness, decision-making processes, and overall operational capabilities, enabling them to adapt and excel in a multi-domain operating environment.

Collaboration with interagency partners, such as civilian agencies and organizations, is crucial in addressing logistics and sustainment challenges in a multi-domain environment. Land forces should establish strong partnerships to leverage resources, expertise, and logistical infrastructure, particularly in humanitarian assistance and disaster response scenarios. By fostering interagency cooperation, land forces can enhance their logistical capabilities and ensure effective support in complex operational environments.

To keep pace with evolving threats and challenges, land forces must prioritize a culture of continuous learning and adaptation. Regular evaluations of lessons learned from operations and exercises should inform updates to training programs, tactics, and doctrines. By staying informed about technological advancements, evolving doctrines, and emerging operational concepts, land forces can adapt their strategies and maintain a high level of readiness in a rapidly changing multi-domain environment.

Given the growing importance of information and communication technology in multi-domain operations, land forces should prioritize cybersecurity and information assurance. Implementing robust cybersecurity measures, including encrypted communication channels and resilient information systems, is essential to protect against cyber threats and maintain operational security. By strengthening cybersecurity and information assurance practices, land forces can ensure the integrity and availability of critical information in a multi-domain operating environment.

Land forces should actively seek collaboration with industry and academia to access cutting-edge research, technological innovations, and best practices. Collaborative partnerships can provide valuable insights, expertise, and access to advanced technologies that enhance land domain readiness and effectiveness in a Multi-Domain Operating Environment. By fostering collaboration with external partners, land forces can leverage their collective knowledge and resources to enhance their operational capabilities and stay at the forefront of technological advancements.

Land forces must continually evaluate and update their logistics and sustainment practices to address the challenges posed by extended lines of communication, intermodal transportation, supply chain resilience, forward logistics, maintenance and repair, and information and communication technology. Embracing innovative solutions such as additive manufacturing, robotics, automation, and unmanned logistics systems can improve agility, efficiency, and resilience in logistics operations. By regularly updating their logistics practices and adopting innovative technologies, land forces can optimize their logistical support and ensure sustained operations in a multi-domain environment.

CONCLUSION

In conclusion, the challenges faced by land forces in a multi-domain operating environment are significant but can be effectively addressed through proactive strategies and innovative approaches. By investing in joint training and exercises, land forces can enhance coordination and interoperability with other military branches and domains, improving their operational effectiveness in multi-domain operations. Embracing emerging technologies, such as artificial intelligence, machine learning, and autonomous systems, can enhance situational awareness, decision-making, and overall operational capabilities in the land domain. Strengthening collaboration with interagency partners, industry, and academia allows land forces to

leverage resources, expertise, and technological advancements, ensuring they remain agile and adaptable in the face of evolving challenges.

Additionally, fostering a culture of continuous learning and adaptation is crucial for land forces to maintain readiness in a multi-domain environment. Regular evaluations of lessons learned, staying informed about technological advancements, and embracing emerging operational concepts enable land forces to adapt their strategies and tactics to effectively counter emerging threats. By prioritizing cybersecurity and information assurance, land forces can protect critical information and maintain operational security in an increasingly interconnected and digitized landscape.

Furthermore, by regularly updating logistics and sustainment practices and embracing innovative solutions, such as additive manufacturing and unmanned logistics systems, land forces can enhance agility, efficiency, and resilience in logistics operations. This ensures sustained operations even in environments with extended lines of communication and dynamic supply chain requirements. Addressing the challenges faced by land forces in a multi-domain operating environment requires a comprehensive approach that encompasses joint training, technological advancements, interagency collaboration, continuous learning, cybersecurity, and modernized logistics practices. By implementing these recommendations, land forces can enhance their readiness and operational effectiveness, enabling them to succeed in multi-domain operations and effectively contribute to overall mission success.

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SOROTAN DARAT VOLUME 1, NUMBER 82, JUNE 2023

1ST PLACE

MULTI DOMAIN OPERATING ENVIRONMENT – LAND DOMAIN READINESS AND CHALLENGES

Lt Kol Suzie @ Suzianna binti Yusof (3010220)
Royal Intelligence Corps

2ND PLACE

CYBER WARFARE – CHALLENGES AND FORCE READINESS: CHALLENGES AND THE ROLE OF THE MALAYSIAN ARMY AS PART OF A JOINT FORCE IN COUNTERING CYBER WARFARE THREATS IN A MULTI DOMAIN OPERATIONAL ENVIRONMENT

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Royal Malay Regiment

3RD PLACE

CYBER WARFARE – CHALLENGES AND FORCE READINESS

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Armed Forces Religious Corps

INFORMATION FOR WRITERS

- The article length limit ranges from 4,000 to 6,000 words, which is around 8 to 11 pages. The writing should be in a size 12 Arial font. The text of the article should be typed at an interval of one and a half lines using the A4's paper format. Articles must be forwarded in both printed and soft copy versions to the *Bahagian Pembangunan Doktrin, MK PLDTD* (*UP: Editor Sorotan Darat*).

- The writing procedure must follow the APA standard or any procedure for writing academic articles which endorsed by the local public universities. The article must have several subheadings. Reference systems such as footnotes and bibliography/references are adopted and sorted alphabetically. An example of its writing method is as follows:

  - Flyod, K. (2009). Interpersonal Communication: The Whole Story. New York: McGraw-Hill

  - Mohd Radzi & Jusang Bolong. (2015). Komunikasi Pemimpin. Jurnal Komunikasi Malaysia , 45 (3), 89-102

  - Risya Zu. (12 Feb 2014). Etos Kepahlawanan Tentera Darat. Utusan Malaysia , ms 9

  - Rozman Malakan, (2011). Pembentukan jati diri insan. http:// www.open subscribe. com/ worldlibrarary /teks /7.html. Capaian pada 30 Mei 2016

- Diagrams, tables and pictures should be used on a limited basis and numbered as recorded in the text description.

- Requirements:

  - Each article must be forwarded together with a brief biodata/background and a softcopy of passport-sized photo of the writer.

  - A synopsis of the article not exceeding 100 words containing the main arguments/opinions discussed in the article.

REMINDER: ARTICLES MUST BE OF THE GENUINE THOUGHTS AND IDEAS OF THE WRITERS AND NOT FROM THE RESULT OF PLAGIARISM.

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