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Takshashila Discussion Document

M-RAF 1.0 - A Model to Allocate Resources Across India's Armed Forces

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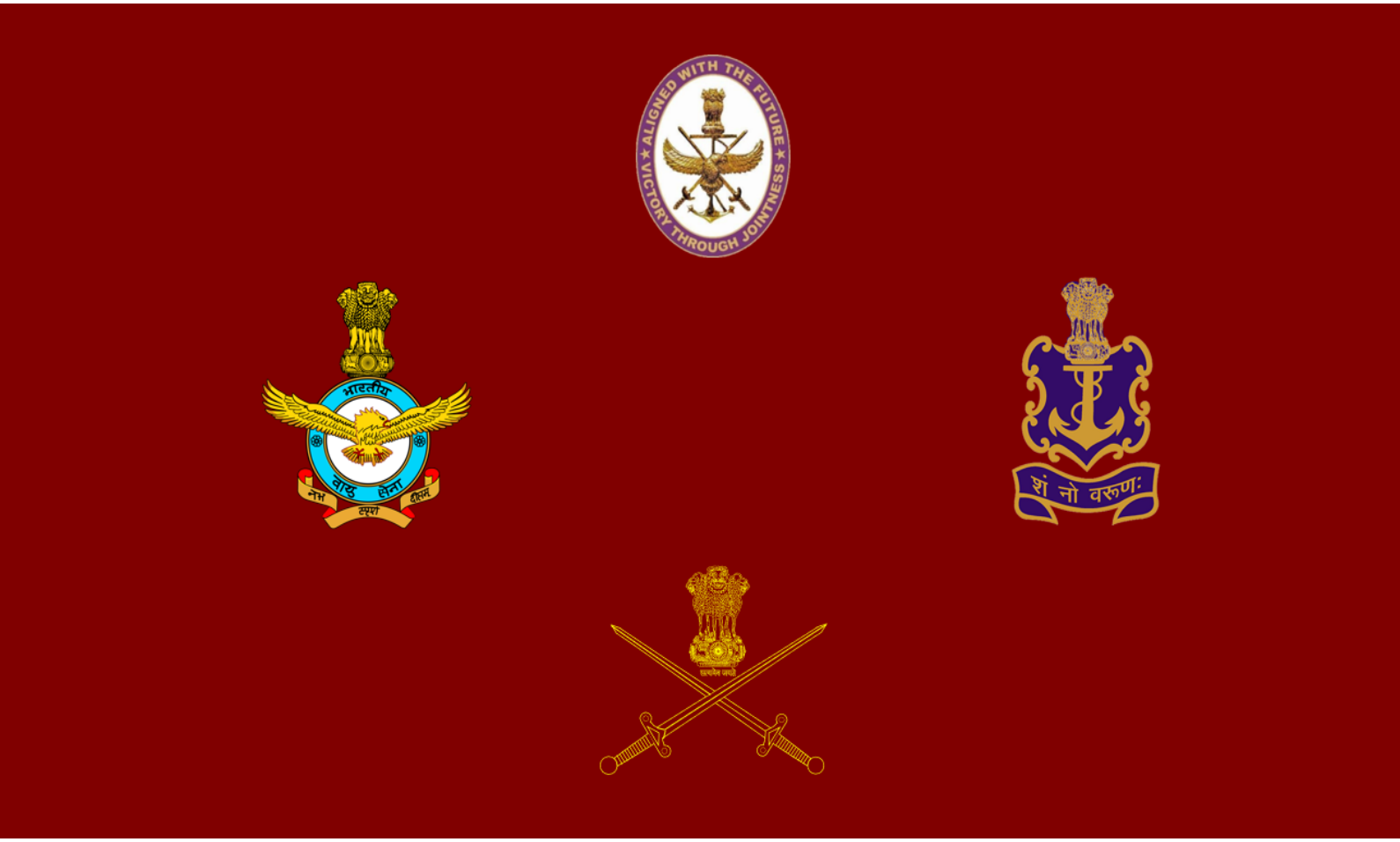


This paper can be cited as "Lt General (Dr) Prakash Menon, Pranav V, Military Resource Allocation Framework 1.0 (M-RAF 1.0) July 2020".

Executive Summary

This discussion document proposes a Military Resources Allocation Framework 1.0 (M-RAF 1.0) for India's armed forces. The M-RAF (1.0), a derivative of the Proposed Theatre Command Model[1], could serve as a decision support tool for military resource allocation planning and can be adapted to any number of theatres. It incorporates the concepts of employable and deterrent military power in the context of the theatre, terrain, and escalation levels. The model leverages economic reasoning concepts to prioritise capability development and resource allotment.

Introduction

This paper aims to provide a model of resource allocation as a tool for integrated military planning based on the Theatre Command System proposed earlier. The Theatre Command System argues for the structuring of a theatre system based on strategic threats and terrain. The aim of the Theatre Command System is to facilitate flexible cooperation in greater quantities of military power which, concurrent with inter-service integration, would cater for centralised joint planning and decentralised application. The model seeks to incorporate the employability of different types of military capabilities in the context of an escalation ladder, taking into account their operational importance in different terrain configurations.

[1] Lt General (Dr) Prakash Menon, India's Theatre Command System: A Proposal, Takshashila Discussion Document, June 2020
https://takshashila.org.in/takshashila-discussion-document-indias-theatre-command-system-a-proposal/

Proposed Theatre Command System

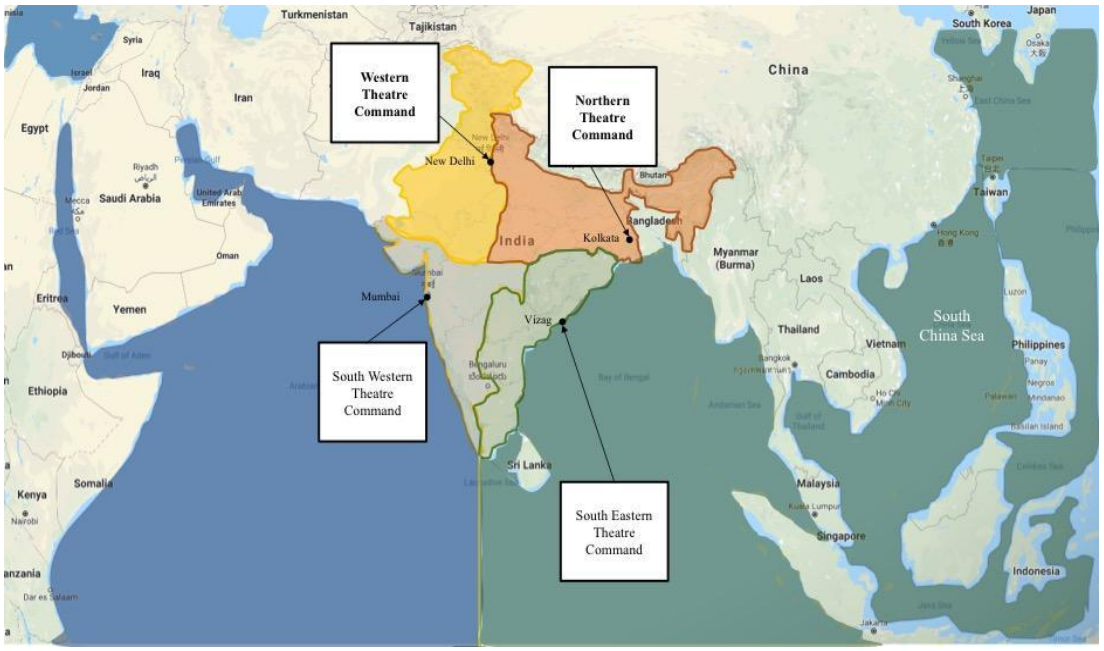


Figure 1 – Proposed Theatre Command System

Four theatre commands are proposed - the Northern Theatre Command, responsible for India's land border with China, Myanmar and Bangladesh; the Western Theatre Command for the Pakistan border; the South-Western Theatre Command and the South-Eastern Theatre Command for the Western and Eastern part of the Indian Ocean. These four theatre commands will be headed by theatre commanders who, in conjunction with the Permanent Chairman and three chiefs, would form the Joint Commanders and Staff Committee (JCSC) at the level of Integrated Headquarters, responsible for military strategy formulation, evolution of long term military capability development plans and allotment of resources. Planning will remain joint throughout the process and replace the existing practice of stitching together service centric plans.[2]

Military Resources Allocation Model (M-RAF 1.0)

Due to the perennially limited budget allocation, many important and consequential trade-offs and prioritisations must be made while distributing the budget between and within services. Given the integrated nature of modernisation planning under the JCSC, a holistic model to distribute and

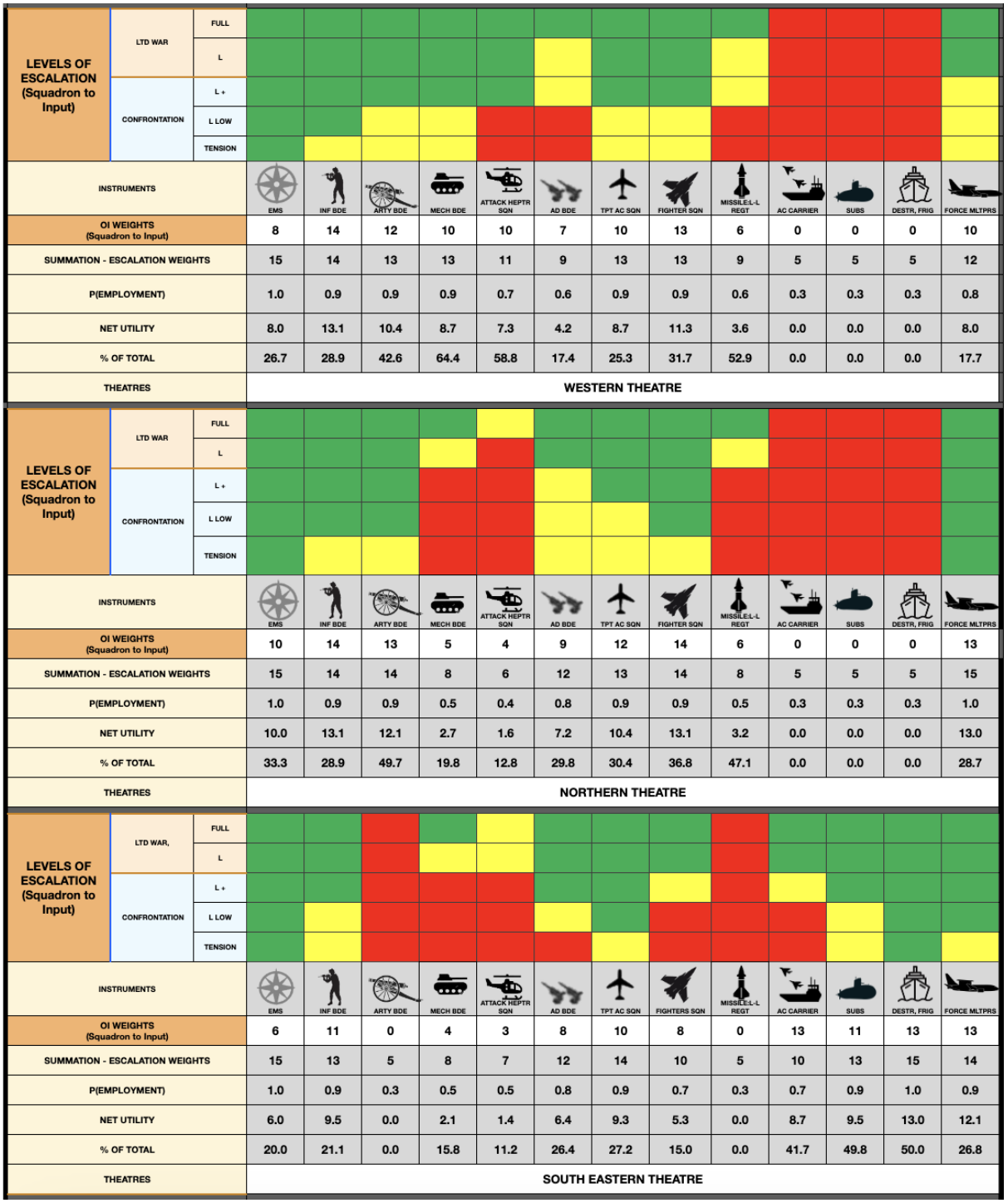
[2] Ibid.

allocate resources, across the three services and the four theatres, is imperative. This model provides a clearer understanding of the trade-offs in capability development and allocating scarce resources across different theatre commands.

M-RAF 1.0 conceptually distinguishes between deterrent power and employable power. The best way to create effective deterrence images is to project military power by being in the possession of robust arms, platforms, equipment, and other military wherewithal embedded in flexible structures, in addition to being undergirded by doctrine and quick absorption of emerging technology. It is another matter that such power may not fully be physically applied - especially between nuclear powers. Force application is therefore in the mind space of adversaries, which is the imagined and perennial battle space. Nuclear weapons, aircraft carriers, submarines, naval ships, fighter aircrafts, strike corps with tanks, mechanised units, Special Forces and artillery, missiles etc., provide deterrent power even though their actual utility is circumscribed by the reality of uncontrolled escalation. Therefore, the requirement is to search for employable power that can be utilised without triggering the escalation spiral.

Employable power resides in systems where coercion is attempted through actual use in a spectrum of conflict encompassing multiple domains. This can be described as, 'Operations Less Than War' (OLTW). Cyber space is the best suited domain for employable power at present as it combines effectiveness through speed and plausible deniability. It can be used to deceive, misinform, divert, blind and impact directly where application of force matters – the minds of decision makers. Electronic and Information warfare systems, along with other force multipliers, are prime examples. These can also include all systems for early warning and defence like Air Defence System, transport aircraft, mid-air refuelers and such other military wherewithal. However, employable power, as related to the level of conflict and escalation; is indicated by the type of military systems in play; the geographic spaces of the conflict and the issues at stake that influence the toleration of risks.

Figure 2 is a graphical representation of M-RAF 1.0. A description of the framework follows.



LEVELS OF ESCALATION (Squadron to Input)														
	LTD WAR,	FULL												
		L												
	CONFRONTATION	L +												
		L LOW												
		TENSION												
INSTRUMENTS			EMS	INF BDE	ARTY BDE	MECH BDE	ATTACK HEPTR SQN	AD BDE	TPT AC SQN	FIGHTERS SQN	MISSILE-L-L REGT	AC CARRIER	SUBS	DESTR, FRIG	FORCE MLTPRS
OI WEIGHTS (Squadron to Input)			6	11	4	0	4	8	8	8	0	13	12	13	13
SUMMATION - ESCALATION WEIGHTS			15	13	7	5	8	12	11	11	5	14	12	15	14
P(EMPLOYMENT)			1.0	0.9	0.5	0.3	0.5	0.8	0.7	0.7	0.3	0.9	0.8	1.0	0.9
NET UTILITY			6.0	9.5	1.9	0.0	2.1	6.4	5.9	5.9	0.0	12.1	9.6	13.0	12.1
% OF TOTAL			20.0	21.1	7.7	0.0	17.1	26.4	17.1	16.5	0.0	58.3	50.2	50.0	26.8
THEATRES			SOUTH WESTERN THEATRE												
CUMULATIVE UTILITY			30.0	45.2	24.4	13.5	12.5	24.2	34.3	35.5	6.8	20.8	19.1	26.0	45.3
% OF CUMULATIVE UTILITY			8.9	13.4	7.2	4.0	3.7	7.2	10.2	10.5	2.0	6.2	5.7	7.7	13.4

*** CAPABILITIES MAY BE VARIED ACCORDING TO PLANNERS REQUIREMENT**
****COLOUR ALLOCATION AND WEIGHT DISTRIBUTION ARE ILLUSTRATIVE AND SHOULD BE DESIGNATED THROUGH JOINT SERVICES EXPERT CONSULTATION**

Figure 2 - Military Resource Allocation Framework 1.0

LEGEND	
INF BDE	INFANTRY BRIGADE
ARTY BDE	ARTILLERY BRIGADE
ATTACK HEPTR BDE	ATTACK HELICOPTER SQUADRON
MECH BD	ARMD/MECH BDE
AD BDE/REGD	AD- ARMY/IAF
TPT AC SQN	TRANSPORT AIRCRAFT SQUADRON
FIGHTER SQN	FIGHTER SQUADRON
MISSILE: L-L	MISSILE: LAND TO LAND REGT
SUBS	SUBMARINES
AC CARRIER	AIRCRAFT CARRIERS
DESTR, FRIG	DESTROYERS, FRIGATES, LCT & AERIAL CAPABILITY PRESENT ON SUCH SURFACE SHIPS
FORCE MULTIPLIERS	AERIAL/LAND/SURFACE/UNDERWATER ASSETS LIKE UAV'S, EARLY WARNING, AWACS, MID AIR REFUELLERS, MARITIME SURVEILLANCE AIRCRAFT ETC.
 EMS	ELECTRO MAGNETIC SPECTRUM FORCE MULTIPLIERS - ELECTRONIC, CYBER AND INFORMATION WARFARE

Table 1.1 Legend of terms used

CALCULATION	FORMULAE USED
P(EMPLOYMENT)	(∑ESCALATION WEIGHTS) ÷15 [1]
NET UTILITY	OI WEIGHTS X P(EMPLOYMENT)

[1] 15 Represents the maximum cumulative escalation weight

Table 1.2 - Calculation and Formulae

DEFINITIONS	LIMITED WAR	FULL	A FULL, UNCONSTRAINED WAR - WITHOUT THE USE OF NUCLEAR WEAPONS (FULL MOBILISATION UNDER THE NUCLEAR THRESHOLD)
		L	LOCALISED WAR IN A CONFINED GEOGRAPHY WITH SOME CONSTRAINTS ON THE USE OF FORCE (PARTIAL MOBILISATION)
	CONFRONTATION	L +	A RESTRICTED AND GEOGRAPHICALLY CONFINED EXCHANGE OF FORCE (LOCALISED MOBILISATION)
		L LOW	CLOSE CONTACT OF OPPOSING ARMED FORCES WITHOUT THE EXCHANGE OF FORCE
		TENSION	A POLITICAL AMBIENCE THAT INVOLVES THE THREAT OF USE OF FORCE

Table 1.3 – Definitions and designations

The above framework is designed solely for military resource planning and differentiates India's military capability into their respective theatres. Within each theatre, 13 different military instruments (which may be modified as required) have been distinguished on the horizontal x-axis - ranging from infantry brigades to aircraft carriers. On the vertical y-axis, five distinct levels of escalation, as relevant to the Indian context, have been differentiated. This ranges from localised tension to full scale limited war under the nuclear shadow.

The framework leverages two pivotal parameters for military planning - the employability of a military instrument, and the operational importance of that military instrument. The employability of a military instrument is dependent upon two major factors: levels of escalation and terrain. The definitions of the different levels of escalation can be seen in Table 1.3.

The second factor of employability is terrain. Given the vastly different terrain within each theatre, the employability of a military instrument varies significantly. *Notably, at this stage, the employability of a military instrument is disconnected from its operational importance.*

The operational importance (OI) parameter is the evaluation of how important a military instrument *is at the highest level of escalation (full-limited war).* For example, although an aircraft carrier may not be employable for lower levels of escalation, when it is employable (at higher levels), its operational importance supersedes that of submarines. Thus, in the Indian Ocean, although aircraft carriers are less employable than submarines, they are more operationally important than them. Therefore, it is the interaction of these two independent yet overlapping parameters of employability and OI that gives the net utility of a military instrument in a given theatre.

Mechanics of the Model

The parameter of employability is categorised into three levels. Red indicates that a military instrument is not employable for a given level of escalation in the given theatre's geography; yellow indicates that a military instrument might be employable, given the particulars of the circumstance, and green indicates that the military instrument is employable for that level of escalation in the given theatre.

The employability parameter is weighted - green colour allocation is weighed as 3, yellow as 2 and red as 1. These are called escalation weights. The summation of

these weights, called the cumulative escalation weight, ranges from a minimum of 5 to a maximum of 15. (If an instrument is marked as red for all five levels of escalation, its cumulative escalation would be 5*1=5. If an instrument is marked as green for all five levels of escalation, its cumulative escalation would be 5*3 = 15).

P(Employment) = Cumulative Escalation Weight of An Instrument/Maximum Cumulative Escalation Weight.

The OI weights, as discussed earlier, indicates how important a military instrument is, when it is employed at the highest escalation level. The OI weights of all instruments must add up to 100 in any given theatre to maintain uniformity across theatres in the model. This weightage must be subjectively allocated in accordance to the threat perception in each theatre. The weightage can be modified based on consultations with experts. The formula for net unit utility of a military instrument -

Net utility of a Military Instrument = P(Employment) x O.I. Weights

By multiplying the OI weights with the probability of employment, one arrives at the net utility of a military Instrument at that theatre. An example is given below. Here, cumulative escalation weight is 14. Thus, the P(Employment) = 14/15=0.93. The OI weight is allocated as 18. Thus, the net utility is 0.93*18= 16.8. When added up across theatres, it provides the cumulative utility of the military instrument.

Levels of Escalation			
	LTD WAR	FULL	3
		L	3
	CONFRONTATION	L+	3
		L LOW	3
		TENSION	2
INSTRUMENT			INF DIV
O.I. WEIGHTS			18
∑ ESCALATION WEIGHTS			14
P(EMPLOYMENT)			0.93
NET UTILITY			16.8

14

Applications of M-RAF 1.0

This heuristic model is primarily designed for Long Term Integrated Military Planning (LTIMP). There are three main applications of this model: it provides a benchmark for the total allocation for each military instrument, how such capability is to be distributed between the four theatres, and the trade-offs between instruments.

Relative Importance of a Military instrument: The value of this model arises when the cumulative utility of one military instrument is taken as a percentage of the grand total utility (between all instruments and across all theatres). These percentages represent how important each military instrument is in relation to the entire military capability. The relative importance can act as a guide for resource allocation between different instruments. Since all the strategic trade-offs are represented in the OI weights within each theatre, and their cumulative employability has already been determined, this final percentage is comprehensive. Thus, this percentage gives an indication of how much investment should be made towards a military instrument and can assist in prioritisation for acquisition.

Military instrument Distribution across theatres: This can be seen in the "% of Total" column within each theatre group section. This represents how much of the total allocation of a military instrument must go to a theatre and can thus indicate the distribution priorities between theatres. For example, the infantry brigade, according to this model, could cumulatively receive 13.2% of the available resource. Of this amount, 39.1% should be allocated to the Western Theatre, 47.8% to the Northern Theatre, 8.7% to the South Eastern Theatre, and 4.3% to the South Western Theatre.

Trade Offs between Military Instruments: This model further enables one to make tradeoff decisions between different military instruments – such as between procuring a Rafale Squadron, an Aircraft Carrier and a Mountain Strike Corps, (in which case these entities could constitute the x axis).

Future Iterations: Future iterations of this model could include several other parameters that would further fine-tune the results of the model – thereby increasing its applicability. These include adding the probability of occurrence of an escalation level, probability of employment in an escalation level, and adding the degree of OI at each level (instead of only at the highest level). Furthermore,

the allocation of OI weights could be done using techniques such as AHP (Analytical Hierarchy Process)[3].

Caveats

Since this model aims to analyse how important and employable a military instrument is, the amount of earlier investment is not incorporated. Future research can focus on incorporating existing assets and could use this framework for additional resource allocations. In this case, the OI Weights would be for the total number of the instruments in the Theatre – and not just a single instrument. For example, the OI weight would not be for one Infantry brigade but for all the Infantry brigades in a given Theatre. Furthermore, while incorporating existing assets, one will have to also consider the marginally declining returns on additional investments.

Secondly, the model, as mentioned earlier, is designed solely for planning purposes - and not as an indicator for operational preferences. This is because, operationally, none of these instruments work in isolation. An Aircraft carrier would always be accompanied with surface ships, submarines, and helicopters - amongst other things. The synergy in such groupings and resultant increase in combat potential is difficult to quantify. Thus, forming an OI weight for operational purposes cannot isolate these weapon systems. In this model, this isolation is done only for acquisition planning and distribution purposes.

Thirdly, the weights allocated in this model should be considered as indicative and not definitive. Weights must be decided subjectively by Joint service domain experts working as teams and should not be derived solely through mathematics.

Finally, this model is an aid to decision making. Needless to say; it does not substitute the experience and judgement of the decision maker.

Conclusion

The need for prioritisation is perpetual and the model is therefore a decision support tool for acquisition, planning, and allocation of resources in the context of competing demands. Its conceptual foundations provide an insight into the relevance of different military capabilities in diverse operational contexts. Both

[3] LLC, Passage Technology. What Is the Analytic Hierarchy Process (AHP)? https://www.passagetechnology.com/what-is-the-analytic-hierarchy-process Last accessed, 27 July 2020

employable and deterrent power are subjective constructs that can have varied interpretations but provide flexibility in the planning process and help arbitrate the differences germane to inter-service interactions.

References

1. Lt General (Dr) Prakash Menon, India's Theatre Command System: A Proposal, Takshashila Discussion Document, June 2020
https://takshashila.org.in/takshashila-discussion-document-indias-theatre-command-system-aproposal/

2. Ibid.

3. LLC, Passage Technology. What Is the Analytic Hierarchy Process (AHP)?
https://www.passagetechnology.com/what-is-the-analytic-hierarchy-process
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